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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XLIV—No. 5



May, 1918

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PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XLIV—No. 5

MAY, 1918

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1918

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American Society of Civil Engineers

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ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.
TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, E. G. Haines, Allen Hazen, James C. Meem, Walter J. Douglas.

ON THE REGULATION OF WATER RIGHTS: F. H. Newell, W. C. Hoad, John H. Lewis.
TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, G. J. Ray, Albert F. Reichmann, H. R. Safford, F. E. Turneure, J. E. Willoughby.

The Reading Room of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HEADQUARTERS OF THE SOCIETY—33 WEST THIRTY-NINTH STREET, NEW YORK.

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CABLE ADDRESS....."Ceas, New York."

* Elected Director April 16th, 1918, to fill the vacancy caused by the resignation of George W. Goethals.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS

OF THE SOCIETY

April 17th, 1918.—This evening was devoted to a meeting of the John Fritz Medal Board of Award for the public presentation of that medal to J. Waldo Smith, M. Am. Soc. C. E., for "achievement as Engineer in providing the City of New York with a supply of water."

Col. John J. Carty, M. Am. Soc. C. E., Past-President, Am. Inst. E. E., and Chairman of the John Fritz Medal Board of Award, presided, and an account of the addresses is given on another page.*

May 1st, 1918.—The meeting was called to order at 8.30 P. M.; Director Samuel T. Wagner in the chair; Chas. Warren Hunt, Secretary; and present, also, 76 members and 6 guests.

* See p. 476.

The minutes of the meetings of March 20th and April 3d, 1918, were approved as printed in *Proceedings* for April, 1918.

A paper by J. A. L. Waddell, M. Am. Soc. C. E., entitled "The Economics of Steel Arch Bridges" was presented by the author and illustrated with lantern slides.

The paper was discussed by Messrs. T. Kennard Thomson, Charles E. Fowler, H. P. Van Cleve, Samuel T. Wagner, and the author, Messrs. Thomson and Fowler illustrating their remarks with lantern slides.

A communication on the subject from Paul A. Blackwell, Assoc. M. Am. Soc. C. E., was read by title only, on account of the lateness of the hour.

The Secretary announced the election of the following candidates on April 16th, 1918:

AS MEMBERS

CHARLES HENRY BLACKMAN, Anchorage, Ky.
EDWARD ABRAHAM BYRNE, New York City
SAMUEL NORTHRUP CASTLE, New York City
CHARLES HOMER CLARK, Pittsburgh, Pa.
GEORGE CONRAD HABERMAYER, Champaign, Ill.
FRANK WASHBURN JENNINGS, Columbus, Ohio
HOWARD EUGENE MOSES, Harrisburg, Pa.
ROBERT LOGAN PEARSON, Providence, R. I.
JAMES CHARLES PINNEY, Jr., Milwaukee, Wis.
GEORGE WILLIAM SCHUSLER, Pittsburgh, Pa.
CHARLES GEORGE SHAFER, Pitman, N. J.
WILLIAM WESLEY VARNEY, Baltimore, Md.
SHERMAN MELVILLE WOODWARD, Iowa City, Iowa

AS ASSOCIATE MEMBERS

KINGSLEY PARKHURST ARNOLL, Washington, D. C.
HOWARD PAUL BAYLY, Richmond, Va.
ALLAN SOUTHER BEALE, Brooklyn, N. Y.
EDWARD MICHAEL BRENNAN, Santo Domingo, Dominican Republic
ROBERT ANDREW CAUGHEY, State College, Pa.
HAZLETON MIRKIL CHADWICK, Valier, Mont.
HERBERT CHARLES OLIVER CLARKE, Washington, D. C.
CLARENCE ALONZO COBURN, Hong Kong, China
NELSON MARTIN COLLIER, Hastings, Nebr.
CHARLES ELDRIDGE DAVIS, Spokane, Wash.
CURT HENRY EIFFERT, Dayton, Ohio
LAWRENCE MACHEMER FISHER, Harrisburg, Pa.
GEORGE MASON GAREN, Stillwater, Minn.

PAUL CHARLES GAUGER, St. Paul, Minn.
PAUL LEO GRADY, Topeka, Kans.
ALEXANDER MONRO GRIER, Wilmington, Del.
GEORGE LOCKWOOD HAWKINS, Elizabeth, N. J.
JOHN NORCOM HENDRICKSON, Ojai, Cal.
ALBERT KELLER HOHL, Philadelphia, Pa.
PHILIP ZELL HORTON, Peoria, Ill.
MORTON WALKER HUTTENLOCH, Montclair, N. J.
HENRY H. HYMAN, Miami, Fla.
SAMUEL LOUIS KONE, Tampico, Mexico
LUTHER CLYNE LASHMET, Kansas City, Mo.
CLARENCE VICTOR MILHOLLAND, Parkersburg, W. Va.
JOHN RIPLEY MONAGHAN, Elmhurst, N. Y.
JULIAN MONTGOMERY, Austin, Tex.
JAMES ARCHIBALD MOORE, Camp Doniphan, Fort Sill, Okla.
ROBERT BRADLEY NICHOLS, Washington, D. C.
RALPH MASON ROBERG, Raymond, Wash.
WALTER ELLSWORTH ROWE, Columbia, S. C.
WILLIAM AUGUSTUS SMITH, Tuckahoe, N. Y.
CHARLES SAMUEL STEVENSON, Eckman, W. Va.
PAUL MCGOWAN TEBBS, Harrisburg, Pa.
ARNOLD HINES VANDERHOOF, New Brunswick, N. J.
ALEXANDER CHARLES WALLER, Fort Sheridan, Ill.
ERNEST WELDEN, Eldora, Iowa
JAMES BAKER WOODSON, Fresno, Cal.
FRANK DENNETT YOST, Philadelphia, Pa.

AS JUNIORS

WILLIAM EUSTACE CHANDLER, Boston, Mass.
FREDERICK WILLIAM CARL EBELING, New York City
JAMES PERKINS EWING, New Orleans, La.
JOHN JAMES HURLEY, Boston, Mass.
THOMAS RICHARD KING, Los Angeles, Cal.
ALBERT LOSSEN LANE, Jackson, Tenn.
JAMES GRAY MCKELVEY, St. Louis, Mo.
HERBERT MARTIN PALMER, New York City
EDWARD ALEXANDER REINKE, Santa Clara, Cal.

The Secretary announced the transfer of the following candidates on April 16th and 17th, 1918:

FROM ASSOCIATE MEMBER TO MEMBER

DAVID BARNARD STEINMAN, New York City
RUPERT KENNEDY STOCKWELL, Salt Lake City, Utah
SAMUEL ARNOLD GREELEY, Chicago, Ill.
HENRY SCHWING KLEINSCHMIDT, Salt Lake City, Utah

CHARLES MACDONALD, White Plains, N. Y.
 ROBERT REIMANN, Relay, Md.
 WILLIAM BEAUVAIS SMITH, JR., New Orleans, La.
 WILLIAM LAWRIE STEVENSON, Philadelphia, Pa.
 BERTRAND HINMAN WAIT, New York City
 BARCLAY WHITE, Philadelphia, Pa.

FROM ASSOCIATE TO MEMBER

ALBERT HENRY BROMLEY, JR., Canton, Ohio

FROM ASSOCIATE TO ASSOCIATE MEMBER

ELMER EARL MOOTS, Continental, Ariz.
 JOHN MILTON RITCHIE, Washington, D. C.

FROM JUNIOR TO ASSOCIATE MEMBER

RALPH TISDALE ALGER, Cleveland, Ohio
 HAROLD WILLIAM BLOEMKER, Philadelphia, Pa.
 ALEC EDWARD BROOK, Sheffield, England
 HERBERT ARTHUR DAVIES, Roanoke, Va.
 RALPH BURROWS EVERETT, Syracuse, N. Y.
 RALPH EDWARD GOODWIN, New York City
 THOMAS HUGHES HOLMES, Camp Grant, Ill.
 JOHN RAYMOND LAPHAM, Washington, D. C.
 SAMUEL MACELROY LOWREY, Baltimore, Md.
 HAROLD GILBERT MCGEE, Toledo, Ohio
 CYRIL ERNEST DAVIS MARSHALL, Garden City, N. Y.
 WILLIAM MENKE, Kingston, N. Y.
 FREDERICK HERMAN MUNKELT, Washington, D. C.
 SAMUEL ISAIAH SACKS, Philadelphia, Pa.
 JULIUS HERSCHEL SERRA, Brooklyn, N. Y.
 HAROLD CLINTON SEWARD, Brooklyn, N. Y.
 PHILIP JOSEPH WALSH, Charleston, W. Va.

The Secretary announced the following deaths:

THOMAS ASPINWALL, of Boston, Mass., elected Member, May 2d, 1888; died March 2d, 1918.

JAMES AUBREY DAVENPORT, of Roanoke, Va., elected Member, April 5th, 1905; died March 15th, 1918.

WILLIAM HUGGINS, of Rio de Janeiro, Brazil, elected Member, February 7th, 1906; died February 21st, 1918.

CLARENCE BOOTH LAMONT, of Seattle, Wash., elected Associate Member, May 4th, 1909; Member, June 24th, 1914; died March 21st, 1918.

JESSE LOWE, of Beardstown, Ill., elected Member, October 2d, 1895; died April 17th, 1918.

WILLIAM McKELVEY MARPLE, of Scranton, Pa., elected Member, June 4th, 1890; died March 20th, 1918.

MARSHALL POPE ROBERTSON, of New Orleans, La., elected Associate Member, March 5th, 1902; Member, September 4th, 1906; died November, 1917.

EDWARD McKIM HAGAR, of New York City, elected Associate Member, February 6th, 1901; died January 18th, 1918.

CLARK WALLACE THOMPSON, of Cascade Locks, Ore., elected Junior, March 5th, 1890; Associate Member, July 3d, 1895; died March 16th, 1918.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

April 16th, 1918.—The Board met at 10 A. M.; President Talbot in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Alvord, Darling, Davis, Duryea, Fay, Flinn, Hawgood, Herschel, Hill, Humphreys, A. M. Hunt, Kittredge, Khuen, Lewis, Noble, Pegram, Rights, Swain, Tillson, Wagner, Wall, and Webster.

Mr. Alvord, Chairman of the Committee on Special Committees, presented a Report.*

Certain resolutions adopted by the Executive Committee on November 1st, 1917, and subsequently approved by the Board of Direction, having been forwarded to the various Local Associations of Members, with request that they consider them, and the Utah Association, the Colorado Association, and the Northwestern Association of Members having taken action on the matter, the whole question was considered by the Board, and the following resolution was adopted:

"Resolved: That while disclaiming any desire to control individual opinion or its expression, or any protest of Local Associations of the Society, made to the Board, against any of its acts, the Board of Direction disapproves and condemns the action of the Utah, Colorado, and Northwestern Local Associations in making public their official action which protested against the action of this Board."[†]

The following resolution with regard to remission of annual dues of members of the Society engaged in the prosecution of the war was adopted:

"Resolved: That the Board of Direction of the American Society of Civil Engineers, recognizing the sacrifices made by the members of the Society who have entered the service of the United States Government, or its Allies, to aid in the prosecution of the war, authorizes

* See page 460.

† A full statement of the action of the Executive Committee of the Board and the three Local Associations, and other Associations, in this matter, will be found on pages 461-465.

the Executive Committee to exempt members in the Military, Naval or auxiliary services of the United States, or its Allies, from the payment of annual dues, and to make such decisions and rules as may be deemed necessary to carry out the spirit of this resolution."

Rules for Admission of Additional Societies to Engineering Council, which have been approved by the Council after conference with the Committee of this Board appointed for the purpose, were presented and adopted.*

A Report of the Committee of the Southern California Association on the Relation of the Society to its Local Associations, etc., together with a letter from W. E. Belknap, M. Am. Soc. C. E., also a member of that Committee, was presented. The Report of the Committee had been approved by the Association. These documents were forwarded for presentation to the Board, and subsequently, if the Board so orders, for publication in *Proceedings*. The entire matter was ordered printed in *Proceedings*.†

An invitation from the American Association of Engineers to this Society to send Delegates to the Annual Meeting of that Association, on May 14th, 1918, at which certain referenda will come up for discussion, as well as other questions pertaining to the welfare of the Engineering Profession, was presented, and the following resolution was adopted:

"Resolved: That the Board of Direction of the American Society of Civil Engineers declines the invitation to send Delegates to the meeting of the American Association of Engineers, as it feels that matters of the character which are indicated by the referenda accompanying the invitation should be handled by and through the Engineering Council, which is an organization representing the leading National Engineering Societies."

The action of the Executive Committee in abandoning the Collations at the Regular Meetings of the Society, as a war economy, was approved, and it was ordered that the Collations be abandoned until further notice.

On the recommendation of the Secretary, the following resolutions were adopted:

"Resolved: That regular business meetings of the Society be held, as required by the Constitution, on the first Wednesday of each month except during July and August, and that at these meetings, in addition to the regular business, professional papers previously published shall be presented for discussion.

"Resolved: That, at the meetings held on the third Wednesday of the month, the programme of papers, addresses, or discussions, shall be placed in the hands of a Committee of seven resident members to be

* See page 473.

† See page 465.

appointed by the Executive Committee and to be known as the New York Meetings Committee, this Committee to be charged with the entire responsibility for the conduct of these meetings."

The resignation of Maj.-Gen. George W. Goethals as a member of the Board of Direction representing District No. 1 was taken up. Gen. Goethals presented his resignation on account of the fact that he had moved to Washington and re-entered the service of the Government and could not attend to the duties of the position.

The resignation of Gen. Goethals was accepted with regret.

On the unanimous nomination of nine resident members present (not including the Secretary), Edwin J. Fort was unanimously elected to fill the vacancy caused by the resignation of Gen. Goethals as one of the Directors representing District No. 1.

Mr. Fort was notified of his election and later attended the meeting of the Board.

The resignation of Louis C. Hill as a member of the Nominating Committee representing District No. 11, on account of inability to attend a meeting of the Committee, was presented, and accepted with regret. Mr. Hawgood stated that the members of the District would like to see Mr. W. K. Barnard appointed to fill the vacancy caused by Mr. Hill's resignation. The Board appointed Mr. Barnard.

The President was authorized to appoint a Committee of three to evolve a plan by which the Directors in each District, or the Secretary, or other officer of the Society, should visit from time to time the various Local Associations.

The resignations of 1 Member, 4 Associate Members, and 3 Juniors, were accepted.

Ballots for membership were canvassed, resulting in the election of 13 Members, 39 Associate Members, 9 Juniors, and the transfer of 16 Juniors to the grade of Associate Member.

Ten Associate Members were transferred to the grade of Member, 1 Associate to the grade of Member, and 2 Associates to the grade of Associate Member.

Applications were considered and other routine business transacted.

Adjourned.

April 17th, 1918.—The Board re-convened at 3.50 P. M.; President Talbot in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Alvord, Davis, Duryea, Hawgood, Herschel, Humphreys, A. M. Hunt, Khuen, Kittredge, Lewis, Noble, Pegram, Rights, and Webster.

A report from the Membership Committee was received and acted upon.

Adjourned.

SOCIETY ITEMS OF INTEREST

Exemption from Payment of Dues of Members in War Service

The following Resolution was passed by the Board of Direction at its meeting on April 16th, 1918:

"Resolved: That the Board of Direction of the American Society of Civil Engineers, recognizing the sacrifices made by the members of the Society who have entered the service of the United States Government, or its Allies, to aid in the prosecution of the war, authorizes the Executive Committee to exempt members in the Military, Naval or auxiliary services of the United States, or its Allies, from the payment of annual dues, and to make such decisions and rules as may be deemed necessary to carry out the spirit of this resolution."

Report of the Committee on Special Committees

"TO THE BOARD OF DIRECTION,

"AMERICAN SOCIETY OF CIVIL ENGINEERS:

"The Committee on Special Committees (who have had referred to it, by the prior Committee of last year, the request of certain members on the Pacific Coast for the appointment of a Committee on Creosoted Wood Stave Pipe) beg to report that the prior Committee of last year have turned over to them a very considerable amount of correspondence which had been accumulated, containing inquiries of all the prominent engineers interested in the subject as to their opinion of the necessity of such a Committee, and their replies thereto.

"Your Committee have been through this correspondence carefully, and find a considerable difference of opinion as to the necessity of such a Committee, particularly at this time.

"There also appears to be some doubt expressed as to whether such an investigation would be entirely free from criticism, owing to the fact that an investigation of that kind has a distinctly commercial side as well as being a problem of purely scientific character, but your Committee feel that the matter which has the greatest weight with them at the present time is the general policy of the Society's investigations, which it is felt ought to be limited, during the war, to those subjects which are of special value to the Government and the country in winning the war.

"After conference and deliberation, your Committee are unanimously of the opinion that it is inexpedient at this time to appoint a Special Committee on the Investigation of Creosoted Wood Stave Pipe.

"Respectfully submitted,

"CHICAGO, ILL.,
"MAR. 15TH, 1918.

"JOHN W. ALVORD, *Chairman*,
EDWIN DURYEA,
GEO. W. TILLSON."

Excess Profits Tax on Income of Engineers

At the meeting of the Board of Direction, April 16th, 1918, a Committee specially appointed by the President for that purpose presented the following statement to the Board.

On November 1st, 1917, the following resolutions were adopted by the Executive Committee. These resolutions were subsequently reported to the Board of Direction and approved, and forwarded to all our Local Associations:

"Whereas, Congress has passed an act known as the War Revenue Act of 1917; and

"Whereas, Under Section 200 of said act it is stated 'The terms "trade" and "business" include professions and occupations'; and

"Whereas, Section 209 of said act states 'That in the case of a trade or business having no invested capital or not more than a nominal capital there shall be levied, assessed, collected, and paid, in addition to the taxes under existing law and under this act, in lieu of the tax imposed by section two hundred and one, a tax equivalent to eight per centum of the net income of such trade or business, in excess of the following deductions: in the case of a domestic corporation, \$3 000, and in the case of a domestic partnership, or a citizen or resident of the United States, \$6 000, in the case of all other trades or business, no deduction'; and

"Whereas, In most cases the professional man's earnings constitute his sole income, from which must be derived the capital which will yield a competency for himself and family, and inasmuch as these earnings are subject to the established income tax, including super-taxes, this same income should not be taxed further as if it were excess profits, when as a matter of fact it is not excess profits; and

"Whereas, It is discriminatory and unjust to tax earned income at a higher rate than unearned income; and

"Whereas, In other countries where incomes are taxed the tax is heavier on unearned than on earned incomes, thus encouraging industry and thrift;

"Resolved, That in the opinion of the Executive Committee of the Board of Direction of the American Society of Civil Engineers, the provisions in Sections 200 and 209, hereinabove quoted, should be repealed because they are discriminatory and unjust.

"Resolved, That the Secretary be and he is hereby directed to publish the above in *Proceedings*, and to send copies to the other National Societies and to the various Associations of Members, urging similar action. Also, to forward copies to Hon. F. M. Simmons, Chairman of the Committee on Finance of the Senate, and Hon. Claude Kitchin, Chairman of the Ways and Means Committee of the House, requesting the repeal of the above-mentioned provisions at the next session of Congress. Also, to urge each member of the Society to act individually by communicating directly with his representatives in Congress along similar lines."

Resolutions disagreeing with the action of the Executive Committee have been received from the Utah Association of Members,

from the Colorado Association of Members, and from the Northwestern Association of Members. All these resolutions condemn the action of the Executive Committee and of the Board as being untimely during the present war, approve the War Revenue Measure which the resolution of the Executive Committee criticized, and urge that the Congress of the United States be not annoyed and handicapped in its efforts to provide means to carry on the war.

The resolutions of the Utah Association state:

(1) That members of the Utah Association brought this same principle to the attention of the parent Society under date of January 29th, 1917, asking that the matter be made the subject of a discussion by the members of the Society through the columns of the "*Transactions*."

(2) That the Executive Committee tabled the said suggestions at a time when such discussion would have been perfectly proper.

As a matter of fact, it does not appear that the first of these statements is correct. The letter in question from Messrs. Charles F. Brown and H. S. Kleinschmidt stated their proposition as follows:

"Through a proposed State Income Tax now before the Legislature of the State of Utah we have interested ourselves in the general question of the justice in taxing the incomes of professional men, and particularly those of engineers, at the same rate and on the same basis as the taxes on incomes derived from property investments and paid by business men."

The letter further states:

"If these questions can be made the subject of discussion by the members of the Society through additional communications on our part and personal discussions of the Central Society meetings we shall be glad to participate in such discussions."

The remainder of the letter is an argument as to the difference between investments made by the professional man and those made by the business man, and the conclusion arrived at is that these two gentlemen are convinced that the rate of taxation on the incomes of professional men should not be as high as the rate of taxation on the incomes from business investments.

This it will be seen is not at all the question which was taken up by the Executive Committee and subsequently approved by the Board of Direction.

The resolutions of the Utah Association, of which Mr. H. S. Kleinschmidt is Secretary-Treasurer (Mr. Kleinschmidt being one of those who wrote the original letter which was tabled by the Board) were ordered sent to each Local Association of Members, and to each Senator and Representative from Utah in Congress.

The Colorado Association at a meeting held December 8th, 1917, in a resolution which quoted the resolutions adopted by the Executive

Committee and the letter of transmittal from the Secretary written by order of the Executive Committee, makes the following statements:

(1) That the Association hopes and believes that these resolutions do not voice the sentiments of the majority of American Engineers. That the statement made that the taxes therein referred to are "discriminatory and unjust" is unwarranted, that the Association regards the action of the Executive Committee as unpatriotic and highly improper, and strongly disapproves of said action.

(2) That with nearly six hundred members of the Society in the military service of the United States, it is peculiarly unbecoming and ungrateful in those of us who stay at home to protest our part in the financial burden.

The following resolutions were adopted by the Northwestern Association of Members of the American Society of Civil Engineers at a meeting held January 18th, 1918.

"Whereas: The Executive Committee of the Board of Direction, of the American Society of Civil Engineers, at a meeting held November 1st, 1917, adopted resolutions asking for the repeal of Sections 200 and 209 of the War Revenue Act of 1917, providing for the taxing of incomes from trade and business and including professions and occupations under the above terms, on the grounds that they are discriminatory and unjust, and,

"Whereas: Our Country is now at war with unusually heavy burdens resting on the Government and every class of citizens is feeling the effects of added taxation to help in prosecuting the war,

"Now, Therefore, Be It Resolved: That the Northwestern Association of Members of the American Society of Civil Engineers regards the action of the Executive Committee in adopting the resolutions referred to as untimely during the present war, and,

"Be It Further Resolved: That this Association approves the war revenue measure, and urges that the Congress of the United States be not annoyed and handicapped in its efforts to provide means to carry on the war, and,

"Be It Further Resolved: That copies of these resolutions be sent to the Board of Direction of the American Society of Civil Engineers, to each Local Association of Members of that Society and to each Senator and Representative from Minnesota in the Congress of the United States."

It would seem as if these Associations of Members had misunderstood the action taken by the Executive Committee, and subsequently confirmed by the Board, and it is submitted that the statement made by the Executive Committee that the excess-profits tax is discriminatory and unjust, and the action in adopting the resolution and sending it to Congress, were neither "unpatriotic" nor "highly improper." The view expressed was practically a universal one.

The Society of Naval Architects and Marine Engineers, to which the action was also forwarded, stated under date of November 27th,

1917, that its Council had decided to take the same action, and adopted the same resolution under date of November 14th, 1917.

A letter was also received from the Secretary of the American Chemical Society heartily approving of the action taken, and stating that he felt sure that society would favor the action.

The minutes of the Duluth Association of Members of the Society, at its November 19th, 1917, meeting, state as follows:

"The resolutions adopted by the Board of Direction relative to the 8% supertax on incomes of professional men, under the new revenue law, were read, and, on motion, duly seconded, it was decided to endorse the resolution and protest the tax as unjust, the protest to be signed by the President and Secretary and sent to representatives of the State of Minnesota in the Senate and House of Representatives and that, in addition, all members of the Association be urged to make personal remonstrances."

At the St. Louis Association of Members meeting of November 26th, 1917:

"A letter from Chas. Warren Hunt, Secretary of the Society, relative to the Resolution of the Executive Committee of the Board of Direction on the War Revenue Act of 1917, together with the Resolution, was read, and the Act was discussed.

"On motion, duly seconded, the Secretary was instructed to write to the Board of Direction, advising it that the Association would do all in its power to have the Act amended."

At the Cleveland Association of Members meeting of January 5th, 1918:

"The resolution of the Executive Committee of the Board of Direction of the Society relative to the War Revenue Act of 1917, was read, and the subject was discussed by Messrs. Leffler, Ellms, Ritchie, Spencer, and F. C. Osborn.

"On motion, duly seconded, the resolution was approved as the action of the Association, and copies were ordered sent to the Senators and Representatives in Congress from Ohio.

"On motion, duly seconded, it was also decided to instruct the Legislative Committee to confer with other professional bodies requesting similar action."

At the February 23d, 1918, meeting:

"The Secretary read communications from the Colorado and Utah Associations in reference to the War Income Tax. Mr. B. R. Leffler reported for the Legislative Committee that he had communicated with all the associations of professional men in Cleveland relative to the subject and that the local chapter of the American Institute of Architects had agreed to co-operate to secure a repeal of Sections 200 and 209 of the law."

At the Portland, Ore., Association of Members meeting of January 11th, 1918:

"The resolution of the Executive Committee of the Board of Direction of the Society, relative to the War Revenue Act of 1917, was presented, and it was decided to address communications to the Oregon Senators and Representatives as suggested and that individual members of the Association should use their personal influence to get the clause affecting engineers and professional men repealed or amended."

The Board adopted the following resolution on April 16th, 1918:

"Resolved: That while disclaiming any desire to control individual opinion or its expression, or any protest of Local Associations of the Society, made to the Board, against any of its acts, the Board of Direction disapproves and condemns the action of the Utah, Colorado, and Northwestern Local Associations in making public their official action which protested against the action of this Board."

Local Associations

The following report (together with the accompanying letter from W. E. Belknap, M. Am. Soc. C. E.) has been received from the Southern California Association, and is here printed for the information of the membership. The original "Report of a Committee, appointed by the Board of Direction, on the Relations of Local Associations of the American Society of Civil Engineers to that Society, to other Engineering Organizations, and Engineers, and to the Public", is printed in *Proceedings* for May, 1917. The action of the Baltimore, Cleveland, Seattle, and Colorado Associations is recorded in *Proceedings* for October, 1917.

The Southern California Association, at its meeting of December 12th, 1917, adopted the report of Messrs. George G. Anderson and Samuel Storow.

"Dec. 12, 1917.

**"TO THE SOUTHERN CALIFORNIA ASSOCIATION
OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS,
Los Angeles, California.**

"GENTLEMEN.—Since submitting its report of August 6th, 1917, endorsing the report of Messrs. Bontecou, McDonald and Jonah on the 'Relations of Local Associations of the American Society of Civil Engineers to that Society, to other Engineering Organizations, and Engineers, and to the Public', as printed in the *Proceedings* of May, 1917, your Committee appointed to consider that report have been instructed to make further report and recommendations on various suggestions submitted by other Local Associations and now submit the following for your consideration, as a basis for discussion of radical changes in the policies of the Parent Society.

"It is the conclusion of your Committee that the modifications of and additions to the Bontecou report suggested by its discussion by the

Seattle Association, of August 27th, 1917, lead most directly to such changes in the administration of the Parent Society as will make it most truly national in character and in influence, and that the principles enunciated in these modifications should receive your endorsement. The elaboration of the details of the changes in the Constitution which will become necessary in the event of the adoption of such alterations, merits further and careful consideration, to which all the members of the Society should devote their earnest attention.

"Your Committee herewith submit each suggestion, with brief comments thereon, with the purpose and hope of concentrating attention and eliciting discussion."

"First, that:

"One or more delegates from each local section be sent to the Annual Meeting, with expenses paid by the Society, and that definite responsibility in the conduct of the business of the Society be imposed upon these delegates."

"It is clear that the adoption of the suggestions entails, as Mr. Jacobs, President of the Seattle Association, points out in his letter to Secretary Hunt of September 17th, 1917, a radical recasting of Article VIII of the Constitution of the Parent Society. It would appear to be advisable to limit the 'Business Meetings' of such delegated organization to one a year, it would be necessary to define clearly the character of 'business' to be transacted only by such delegated organization, and just as clearly that general attendance at such Annual Meetings should be encouraged, although the 'business' would be conducted only by the appointed delegates. The number of delegates should be fixed on the basis of proportional representation, and that, not necessarily upon the membership of the Local Associations, but upon the membership in the Parent Society in the districts into which the distribution is now, or may later be subdivided.

"Second, that:

"All applications for membership be considered by the Local Section having jurisdiction before being acted upon by the Board of Direction."

"The Bontecou report recommends that the Local Association 'should investigate carefully the qualifications of any candidate for admission to the Society, about whom the Board of Direction desires information, and make an official report at the request of the Secretary of the Society.'

"The Seattle Association's suggestion goes much farther, making it a function of the Local Association to consider such applications, without request, and, practically, in advance of action by the Board of Direction. It is highly probable that, in considering applications at the present time, the Board of Direction, if in doubt, does not take final action without consultation with the officers of the Local Association. The suggestion of the Seattle Association merely makes the probable custom an official requirement, the advisability of which cannot be doubted.

"In connection with this suggestion, attention may be directed to the paragraph 'Ethics', in the Bontecou report, in which the following provision is made:

"Charges made by any member of the Society that any member of the Section has violated this code should be promptly investigated by a committee of the Section, and its findings officially reported to the Board of Direction."

"As details, consideration should be given to the means of creating such committee and to the propriety of its findings being submitted, first, to the Local Association for approval, before being reported to the Board of Direction."

"Third, that:

"Professional papers be first presented to a local section except those that may be selected for annual meetings or conventions."

"Such provision, latterly, has become the practice; its advantages are patent."

"Fourth, that:

"A sufficient proportion of the annual dues be remitted to the Sections to care for the necessary expenses."

"The Local Associations already organized have exercised a stimulating influence on the Parent Society, have materially increased its membership by bringing the advantages of association closer to the younger members of the profession; and the influence of the Local Association is limited by financial ability. The advisability of increasing the dues of membership in Local Associations to more than \$3 per annum, in addition to the dues to the Parent Society, is doubtful, and the remission of such an amount, or 20%, from the dues to the Parent Society to the Local Associations, on the basis of their membership, would not embarrass the treasury of the Parent Society, even with the addition of the expenses of delegates to the Annual Meeting. Such provision may affect the distinction between Resident and Non-Resident Members, as the number of the Local Associations increases within the present Resident zone. That distinction is now confined to a limited area, though it comprises one-seventh of the total membership of the Society, and it is not improbable that any loss incurred in resident dues would be offset by the increase of dues from the general increase in membership resulting from the activities of the Local Associations. Uniformity in the dues to the Parent Society is thus foreshadowed, for which, with the increase in the number of Local Associations, there would be justification, if, otherwise, the total amount of dues is sufficient for the financial necessities of the Parent Society, and if the Resident Member is not to be taxed for the advantages of ready access to headquarters, library, and other facilities."

"Fifth, that:

"The work of headquarters' office be developed along the line of general administration including the appointment and direction of standing committees, issuing the publications and arranging for annual meetings and conventions, with the added responsibility of extending the influence of the Society through Local Sections."

"Some such limitation is inevitable, if the preceding alterations in general policy are adopted."

"Sixth, that:

"Local Sections shall consist of not less than twenty-five (25) nor more than five hundred (500) members of all grades."

"The Bontecou report makes the minimum membership in a Local Section 'at least twenty-five members of all grades'. There does not appear to be any good reason for a limitation of the maximum membership, though a study of the geographic limits of the thirteen districts, into which the Society membership is now subdivided, indicates the improbability of any one Local Association reaching a membership of 500.

"Your Committee believes that consideration should be given to the designation 'Section' proposed to be given to the Local Associations, by the Bontecou report. It is desirable that the designation be as descriptive as possible and acceptable to the members."

"Your Committee favors the endorsement of the general principles embodied in the various suggestions made by the Seattle Association.

"GEORGE G. ANDERSON, *Chairman*.

"SAMUEL STORROW."

"DECEMBER 6TH, 1917.

"MR. H. W. DENNIS,

"SECY., SOUTHERN CALIFORNIA ASSOC. OF MEMBERS, AM. SOC. C. E.,
"Los Angeles, Calif.

"MY DEAR MR. DENNIS.—With reference to the discussion on December 12th of the communication from the Seattle Association, I shall not be able to be present, but wish to express briefly some views on the various suggestions in their order as follows:

"*First*.—The business of the Society is already delegated to a Board of Direction, as it should be, and the proposition to create another Board to act at the Annual Meeting or business meetings will either divide responsibility or complicate it. I can see no useful purpose in the suggestion. The Director representing our District will always be fully qualified to express its opinion at the regular meetings of the Board of Direction.

"*Second*.—All applications for membership can now be considered by any Local Section, and acted upon by it, if it is deemed necessary. To make it mandatory that they should be acted upon by Local Sections before going before the Society as a whole does not seem to add in any way to the discrimination which should be exercised on applications.

"*Third*.—There seems to be no objection that professional papers be first presented to a Local Association, but there is an objection in this provision being made mandatory.

"*Fourth*.—If the scheme as outlined should be carried out, and a portion of the dues remitted, there is no doubt that the Resident Members of the Society living in District No. 1 would be justified in asking that the excess dues which they pay should be omitted. This would reduce the dues of the Society about \$17 000. Fifteen dollars per year does not seem to be any more than compatible with a Society of the character of the Am. Soc. C. E., and it might be well to mention here that there are some 125 subscribers to the publications of the Society who pay more than \$15 per annum for the privilege of receiving them.

"It would seem to me that the functions of any General Meeting of a large organization cannot be more than to register new sentiments or ideas, and that these must always be digested and developed by the smaller body of Directors who are elected to manage the affairs of the Society. The means of taking a general vote by the whole Society on any subject is already provided for.

"I understand that the meeting of the Society last night was addressed by Mr. Hunt, the Secretary, who gave a very valuable historical outline of its development, and that this will be printed in the December *Proceedings*. It would seem to me to be wise that any discussion on this subject should not be concluded until this address is read over by the members.

"Yours very truly,

"W. E. BELKNAP."

Engineering Council's Growing Activities

At the regular bi-monthly meeting of Engineering Council on April 18th, 1918, many matters of common concern to engineers, as well as some of public welfare, in which the Profession is interested, were acted upon. There was a large attendance, and representatives from several other bodies appeared before the Council. The procedure for the admission of additional societies to membership in Engineering Council was perfected, and several societies were nominated; important new committees were created, and statements of work done were received from committees previously appointed.

The American Engineering Service has continued busily engaged in responding to requests from the War, Navy, and other departments of the Government, for men for special technical services. Chairman George J. Foran, of this Committee, reported that large numbers of names had been supplied through the co-operation of leading engineering and chemical societies. Special assistance is being given to the Ordnance Department in securing officers to expedite production; to the Navigation Bureau in finding men for the submarine service; to the Signal Corps in procuring special employees for aviation work; and to the Tank Corps in enlisting non-commissioned officers and mechanics. In connection with the last item the Military Engineering Committee of New York has supplied engineering specialists to interview candidates in the rooms of the American Society of Mechanical Engineers and the American Society of Civil Engineers. General arrangements for these interviews were made by Capt. R. C. Stevens, of the Army Tank Corps, through the offices of Engineering Council.

The War Committee of Technical Societies, of which D. W. Brunton is Chairman, has official connections with the War Department, as well as with the Naval Consulting Board. Its function is to review the many new inventions and other suggestions constantly being received, and select those worthy of investigation or development by

the Navy, War, or other Departments. Being of a confidential nature, the details of the work of this Committee cannot be published.

On the recommendation of the Public Affairs Committee, Charles Whiting Baker, Chairman, a resolution was passed urging the authorities of the engineering schools of the country to direct all their resources to the winning of the war in such ways as relieving from routine duties, as far as practicable, teachers engaged in work for the Government or on other war work, and allowing such teachers the assistance of undergraduate students; by crediting such students for this work, if it can be done properly, by relieving them of prescribed work in their courses of less importance; by offering shops and laboratories for the solution of war problems; and by training undergraduates in the fundamentals of engineering, even at the sacrifice of some specialization on subjects not connected with the war. The Secretary was directed to send copies of this resolution to the technical colleges.

Professor L. P. Breckinridge, Chairman of the Fuel Conservation Committee, reported that matters of importance had been considered for the Fuel Administration and for the Bureau of Mines.

In order to follow up the good work in connection with water-power legislation, begun by Engineering Council, and to be prepared for effective action on other questions arising in the broad field of utilization and conservation of water for municipal supply, power development, irrigation, sewage disposal, and navigation, a new committee, to be known as the Water Conservation Committee, was formed.

Matters concerning the welfare of engineers in the war services of the Government have received hardly more than accidental attention from the engineering societies and, in some instances, none at all, because of the lack of a suitable organization to deal with them. To meet these needs in a broad way, Engineering Council authorized the formation of a Military Aid Committee to deal with activities ranging from supplying the needs of some engineering unit in a training camp or in combatant service to assisting the Government authorities in recruiting special engineering units or utilizing military engineering units on public works after the war.

The question of licensing or registering engineers under State laws was referred to the Public Affairs Committee for study and the organization of a special sub-committee to deal with the subject actively.

Chairman J. Parke Channing, of Engineering Council, announced that the following well-known engineers had accepted appointment on the Patents Committee, created by the Council at its February meeting: Charles A. Terry, Chairman, C. A. P. Turner, Corydon T. Purdy, J. Parke Channing, Horace V. Winchell, Edwin J. Prindle, D. S. Jacobus, and Frank N. Waterman. This Committee will investigate reforms in the United States Patent system and in the use of experts in litigation wherein the validity of patents or other technical

matters are involved, co-operating with similar committees of the National Research Council and technical societies.

By invitation, President F. P. Fish of the National Industrial Conference Board presented to Engineering Council, resolutions adopted by the Board at its meetings being held in New York City. These resolutions requested Engineering Council, as the representative of the great engineering societies of the United States, to investigate and publicly express itself as to whether or not the Nation is gaining or losing in industrial efficiency, and what causes, if any, are influencing the condition, and in what manner, broadly, it is believed, industrial efficiency can be further stimulated. These resolutions also urged opposition to proposals under consideration in Congress in connection with appropriation bills to prohibit, diminish, and condemn the payments to public employees, or employees of private establishments under Government control, of any cash reward, premium, or bonus for superior services. Mr. Fish was accompanied by Mr. James A. Emery of the War Labor Board, who presented strong arguments in support of the resolutions. By vote of Engineering Council, the Chairman appointed as a special committee to give this matter immediate attention: Professor George F. Swain, Chairman, E. W. Rice, Jr., Chas. T. Main, Alexander C. Humphreys and Benjamin B. Thayer.

At the request of the War Committee of Technical Societies, an officer who had had extensive experience on the Western Front, explained to the Council the importance of having a suitable proportion of engineers, superintendents, and foremen, who had had practical experience in construction work, properly distributed among the fighting troops in addition to those in the engineering and labor regiments.

The relationship of Engineering Council to local societies received extensive consideration, and will come up for action at a later meeting of the Council.

Action of Engineering Council in Reference to Industrial Efficiency

Engineering Council has appointed the following Committee on Industrial Efficiency: George F. Swain, Chairman, E. W. Rice, Jr., Charles T. Main, Alexander C. Humphreys, and Benjamin B. Thayer.

Owing to the rapidity with which the Army and Navy Appropriation Bills are being considered by Congress, and the fact that these bills contain proposals opposed to well-tried industrial methods for improving efficiency and increasing production in manufacturing plants, the Committee without delay drafted a resolution which was adopted by special action of Engineering Council. The resolution is as follows:

"Whereas, the winning of the War imperatively demands highest efficiency and maximum production in every branch of industry, and

"Whereas, we are informed that Congress has under consideration in the Naval and Army appropriation bills proposals to prohibit, diminish and condemn the payment to public employees or to employees of private establishments under Government control any cash reward, premium or bonus for superior service, and

"Whereas, these methods if applied with due regard to wages, surroundings, health and safety of the employees, will increase efficiency and production, help win the War and preserve our institutions, be it, therefore,

"Resolved, that in the opinion of Engineering Council, representing American Society of Civil Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers, and American Institute of Electrical Engineers, together having 33 000 members, it is vital to the winning of the War that no legislation or other measure should be adopted which may interfere with highest efficiency and maximum production, but that on the contrary every proper means should be taken to increase efficiency and production."

This resolution was telegraphed to the Senate Committee on Naval Affairs and to Charles M. Schwab, Manager of the Emergency Fleet Corporation. It was also sent to the Senate Committee on Military Affairs and to a number of engineers in the home States of the Senators on these two committees, with a request to these engineers that they communicate at once with their Senators.

The objectionable clause in the Appropriation Bills is as follows:

"That no part of the appropriations made in this Act shall be available for the salary or pay of any officer, manager, superintendent, foreman, or other person having charge of the work of any employee of the United States Government while making or causing to be made with a stop-watch or other time-measuring device a time study of any job of any employee between the starting and completion thereof, or of the movements of any such employee while engaged upon such work; nor shall any part of the appropriations made in this Act be available to pay any premiums or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operation of any Government plant."

Engineers, especially those engaged in industrial operations, will readily understand the serious effect which legislation of this kind would have on private plants engaged largely or exclusively on war work under the appropriations carried in these bills. It is most important that such measures should not be enacted.

A careful reading of the third preamble of the resolution adopted by Engineering Council will show that the Council and its Committee fully realize that the best interests of the workmen must be conserved, and its action has no ulterior purpose to the contrary. The earnest desire of Engineering Council is patriotically to promote in every way

the largest production and best efficiency of the country's industrial establishments.

On the subject matter of the resolution adopted on April 18th, 1918, by the National Industrial Conference Board, the Committee is now concentrating its attention and making a careful investigation. The resolution is as follows:

"Whereas, it is daily becoming more apparent that the winning of the war demands the highest efficiency in every kind of production, and

"Whereas, many causes and circumstances have unfortunately operated to obstruct, diminish and even interrupt necessary war production, and there is much information and experience to justify the belief not only that we are in many instances securing less production per unit of time and person than heretofore, but that the country is continuously confronted with proposals to lessen the hours of production without first determining the wisdom of such action, and

"Whereas, it seems that manufacturers are not fully alive to the necessity of not only providing the best and most systematic service instruction to new labor but should constantly be endeavoring by every practical means to improve the efficiency of the older force, the plant and themselves, and

"Whereas, it appears that Congress has under consideration in the Naval and Army Appropriation bills proposals to prohibit, diminish and condemn the payments to public employees or to employees of private establishments under Government control any cash reward, premium, or bonus for superior service and to forbid time studies, and

"Whereas, it appears that the members of the great Engineering Societies of the United States are peculiarly qualified by virtue of their knowledge and experience to express an opinion upon the present efficiency of our production and the most practical means of increasing the productive capacity of both management and men and to call to public attention questionable proposals threatening our efficiency as a nation and therefore our capacity to perform our full duty in this great struggle.

"Therefore, be it Resolved that the National Industrial Conference Board respectfully requests the Engineering Societies of the United States to investigate and to publicly express themselves as to whether or not we are losing or gaining in industrial efficiency, and to state what causes, if any, in their opinion, are influencing the condition, and in what manner broadly they believe our industrial efficiency can be further stimulated."

Rules for Admission of Additional Societies to Membership in Engineering Council, Approved February 21st, 1918

1.—The expression "additional society" as used in these rules refers to any society elected to membership in Engineering Council, other than the Founder Societies of United Engineering Society

(American Society of Civil Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers, and American Institute of Electrical Engineers).

2.—Any representative on Engineering Council shall have the privilege, at any meeting of the Council, of proposing for membership in Engineering Council the name of any national engineering or national technical society, being a society which is national in the scope of its activities and is not by its title identified with any State or municipality, and is devoted to the advancement of the Engineering arts and sciences, such proposal to be in writing setting forth the name and general standing of the society and number of its members.

3.—A proposal for membership, made in accordance with Rule 2, shall be acted upon by Engineering Council at its next regular meeting, and, if favorably acted upon, shall be submitted to the Trustees of United Engineering Society for the purpose of securing the approval of the governing body of each of the four founder societies.

4.—If a proposal be approved as provided in Rule 3, the Secretary of Engineering Council shall then notify the nominee of the desire of the Council to have the proposed society become a member, informing it of the duties and obligations it will incur, of the number of representatives to which it will become entitled on Engineering Council, and of its privileges as a member of the Council.

5.—Upon the receipt by the Secretary of Engineering Council of a written communication from the proposed "additional society", expressing its intention to become a member of Engineering Council, and the payment to the Treasurer of United Engineering Society of the required entrance fee, the said society shall become a member of Engineering Council.

6.—Each "additional society" shall be entitled to name one representative, provided it has not over 2 000 members; if it has more than 2 000, it shall be entitled to name an additional representative for each additional 2 000 members, or any fraction thereof not less than 500; but its total number of representatives shall not exceed 5.

7.—Each "additional society" admitted to membership in Engineering Council shall pay an entrance fee of \$250 per representative which it is entitled to have on the Council, and thereafter assessments shall be the same per representative for each Founder and "additional society". United Engineering Society shall not be assessed for its representatives.

8.—Any "additional society" may withdraw from membership in Engineering Council at the end of any calendar year, provided written notice of the intended withdrawal shall have been sent by the society

to the Secretary of Engineering Council and all indebtedness of the society to Engineering Council shall have been paid.

9.—In case two-thirds of the representatives on Engineering Council, including at least three representatives of each Founder Society, shall vote in favor of the termination of the membership of any "additional society", such membership shall cease, said vote to be taken by letter-ballot.

10.—These rules may be amended or additional rules adopted by a majority vote of the representatives of the Council, upon the approval of the governing body of each of the four Founder Societies.

Addresses at the Public Presentation of**The John Fritz Medal****to****J. Waldo Smith, M. Am. Soc. C. E.****April 17th, 1918.**

COL. JOHN J. CARTY.—Ladies and Gentlemen: As Chairman of the John Fritz Medal Board of Award, I have the great honor and privilege of presiding at this meeting, which is called for the purpose of presenting the John Fritz Medal to Mr. J. Waldo Smith for his most distinguished services in Civil Engineering, and particularly in connection with the work on the great aqueduct, which has just been completed.

You will hear from the speakers of the evening in most eloquent terms much about Mr. J. Waldo Smith and his wonderful work. I will say just a word about the medal, the award of which is considered the highest honor which can be conferred on an engineer in America. It is not simply a medal given by the members of one society, for it is awarded by a Board composed of the four great National engineering societies of America: The American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining Engineers.

In practically all cases the members of the Board of Award are Past-Presidents of those Societies. The names of the most distinguished engineers are rigorously canvassed; and this year the very great honor fell to our colleague.

The medal itself was founded in 1902 in honor of John Fritz, of Bethlehem, Pa. The Board of Award is composed of sixteen men, as I have just described, and the medal has been awarded to men only of the most distinguished achievement and of the very greatest fame. The first award was to Lord Kelvin for his work in cable telegraphy; the next to George Westinghouse; then to Alexander Graham Bell; Thomas Alva Edison; Charles T. Porter; Alfred Noble; Sir William H. White; Robert W. Hunt; John E. Sweet; Dr. James Douglas; Dr. Elihu Thomson; Dr. Henry M. Howe; and now, this evening, the medal is to be presented to J. Waldo Smith.

I will not undertake to say more, but will introduce Mr. Nelson P. Lewis, Vice-President of the American Society of Civil Engineers, and for many years Chief Engineer of the Board of Estimate of the City of New York. Mr. Lewis is an old colleague and fellow-engineer of Mr. Smith, and you will be very glad indeed to hear his words of appreciation.

I have very great pleasure in introducing Mr. Lewis.

NELSON P. LEWIS.—Mr. Chairman, and Gentlemen of the Board of Award, Ladies and Gentlemen: The remarks of the Chairman,

and the programme of the evening have told us of the origin of the John Fritz Medal in 1902, and the names of the thirteen men on whom it has already been bestowed. They constitute a select roll of honor, and we are here this evening to celebrate the addition of one more name to the list. I esteem it a rare privilege to be permitted to speak for the Engineering Profession in extending our congratulations to the latest recipient of the honor.

Mr. Smith is so well known that an extended review of his professional activities will be unnecessary, but a brief outline of the development of a conspicuously successful hydraulic engineer may not be out of place. It would be difficult to find a better instance of the success which is quite sure to result from persistent devotion to all phases of a particular line of engineering work. It began in his boyhood, when, as a lad of 15, he eagerly availed himself of such opportunities as were afforded to help in the construction of a water-works system for his home town in New England. It was a very modest plant, consisting of a small reservoir and pumping station, and about 4 miles of pipe. Probably it was the most important improvement the town had undertaken, and he not only tried to make himself generally useful on the work, but made it the subject of his school compositions and essays. That his interest was intelligent and his volunteer work was of real value is shown by the fact that, several years later, when a vacancy occurred, he, though still a boy of 17, was given charge of the operation of the plant, acting as fireman, engineer, and general superintendent of the work.

This experience appears to have brought a realization of the need of a thorough scientific education, and, after two years in charge of these works, he entered the scientific course at the Phillips Andover Academy. Then followed two years of service with a water-power company, where much time was devoted to the measuring of water. His technical education was not yet complete, but was rounded out by the full engineering course at the Massachusetts Institute of Technology, his summer vacations being devoted to practical work with a water-power company.

It has been said that the young graduate of an engineering school is not an engineer, but one who may with practical experience soon become an engineer. This alternation of study and practical application of what he had learned proved an ideal training, and when he received his degree in engineering he was a real engineer, rather than a man who might readily become one through practical experience; and it is not surprising that his progress after graduation was rapid.

In 1890 he became connected with the East Jersey Water Company, and for the next 13 years was engaged in the construction of an extensive system of reservoirs and pipe lines to supply a number

of towns in Northern New Jersey, his work here culminating in the design and construction of the filtration plant at Little Falls, which was at the time the largest in the United States.

In 1903 the Aqueduct Commissioners of New York City wanted a chief engineer, and the position was offered to and accepted by Mr. Smith. The large new Croton Dam was then under construction, and the necessity for its prompt completion was believed to be imperative. The work was pushed energetically, and the impounding of water began within the following year. During his incumbency of this office other important parts of the Croton Water Supply were under construction, including the Jerome Park Reservoir, the Muscote Dam, and the building of roads and bridges, while the plans were prepared and construction was commenced on the Cross River Reservoir.

In 1905 came the opportunity for which Mr. Smith's experience had peculiarly qualified him. The project of the Catskill Water Supply for New York, so persistently and successfully advocated by Mayor McClellan, who fully understood its magnitude and importance, had been finally authorized, and the Commission created by the statute selected Mr. Smith as Chief Engineer. It was a huge undertaking, involving the construction of a great storage reservoir in the Catskills, the enlarging of the Kensico Reservoir, and the building of a large distributing reservoir near the northerly boundary of the city, in addition to an aqueduct nearly 100 miles in length which must cross the Hudson River and other streams.

This work has been described so fully and so frequently that no outline of it will be attempted at this time. Its total cost was estimated to be about \$175 000 000, and it was obviously necessary to plan its execution so that the different parts of the work should be completed at such times as would permit the delivery of water at the earliest possible date—first to reinforce the Croton supply and then bring it directly to the city, avoiding heavy carrying charges on portions of the work completed long before they could be used, a too frequent occurrence in projects of this magnitude. The plans and general programme were worked out with this purpose in view.

When first outlined they may have appeared somewhat extravagant. The organization proposed was large and very complete, providing for thorough investigations, the preparation of plans, and orderly construction. It included provision for expert geological study to determine the most advantageous location and the depth of the river crossings, for the architectural as well as the engineering design of the great dams, and the landscape treatment of their surroundings, and many other details which are commonly left to be determined at a later date and too often in a hasty and ill-considered fashion. The wisdom and foresight of the designer, however, were shown to have been amply justified, and it is doubtful if an undertaking com-

parable with this in scope, in cost, and in difficult engineering problems has been so well synchronized in its various parts and so executed as to render in so short a time the service for which it was designed.

A modern system of water supply lacks most of the spectacular features of those of ancient times, when long aqueducts spanned the valleys—structures which to-day afford striking examples of the engineering and architectural skill of the builders of those periods. Mr. Herschel has pointed out that the skillful engineer will use to the best advantage the materials and facilities at hand. "This is what the Romans did," he says, "not having cast-iron pipes, they builded as best could be done without them, and were we deprived of cast-iron, wrought-iron, and steel pipes, we should to-day be obliged to build water-works pretty much as they built them." This intelligent use of modern materials and facilities has permitted much saving of time and expense, even though it may have involved a loss of the picturesque and spectacular. Our aqueducts are underground, and, except for an occasional stretch of embankment or a cleared right of way, there is little trace of the existence of the life-giving stream of water flowing uninterruptedly from the mountains to the great city—nothing to indicate the difficult engineering problems which had to be solved.

The crossing of the Hudson, for instance, owing to the great depth of the river gorge, presented peculiar difficulties which were solved in a novel and ingenious manner. While the work on the great reservoir in the Catskills and portions of the long aqueduct was getting under way, the most careful study was being devoted to the best location of the river crossing. The narrows between Storm King and Breakneck Mountains appeared most advantageous, provided sound rock were found at a reasonable depth. Borings were made from scows anchored in the river, and the drills were sent down for hundreds of feet, but, before rock suitable for tunneling was found, high winds or collisions by river craft resulted in a loss of the core borings. It was finally decided to sink shafts, about 200 ft. in depth, on each side of the river and to drill holes from the bottom of these shafts, inclined at several angles, and thus decide beyond question at what depth sound rock was sure to be found. In drilling holes 2 000 ft. or more in length, however, it was of the utmost importance to know that their proper inclination to the horizontal was maintained; or, what was the departure from that inclination? To determine this, recourse was had to what has been called a hydrofluoric acid survey, which consisted in the insertion into the borings, at intervals of about 100 ft., of glass tubes containing hydrofluoric acid. After lying there for some 30 min. they were withdrawn, and at the surface of the acid there was etched on the glass a line which showed the inclination to the horizontal at that point, and a profile of the borings could thus

be made. This indicated that at a depth of about 1000 ft. below the river surface, good tunneling rock was to be found. The shafts were accordingly carried to a depth of 1115 ft. below tide, or 1125 ft. below hydraulic grade, and the tunnel was driven from each of the shafts at that depth in rock so firm and sound that very little water was encountered.

At the Rondout and Wallkill, borings showed that the glacial gorges were far below the existing beds of these streams, and not directly beneath them. This made it necessary to construct siphons about $4\frac{1}{2}$ miles in length, and at depths considerably below sea level. Then there was the pressure tunnel under Manhattan Island and parts of the Bronx and Brooklyn, passing under the Harlem and East Rivers, and varying from 200 to 750 ft. below the surface. Again, there is the pipe line under the Narrows by which the Catskill supply is delivered to the Silver Lake Reservoir in the Borough of Richmond. And now there is to be added the long tunnel through Shandaken Mountain by which the waters of the Schoharie are to be turned into the Ashokan Reservoir.

All these structures are far beneath the surface, well out of sight, and the difficulties encountered and the skill displayed in their solution can only be appreciated by those who were familiar with the work during its progress, or those who will take the trouble to examine the official plans and reports.

There are still impressive evidences of the skillfulness and thoroughness of the work, but most of them are far from the city, such as the great dams at Ashokan and Kensico, with their simple but admirable treatment, and the very attractive features added by the aerating fountains at each, while the Gilboa Dam on the Schoharie is still to be built. The City of New York, doubtless, will be commended, rather than criticised, for the relatively slight additional expense involved in making these structures dignified and attractive, and worthy of the great city which has carried out this undertaking. The fine highways, which have been built along these reservoirs, and the admirably designed bridges carrying them across the watercourses, contribute in a marked degree to this impression. They are public structures of the City of New York, and, though far beyond its corporate limits, they should be a credit to the city. And yet, it required no small degree of courage to recommend that they should be made attractive as well as simply utilitarian.

The element of time has been referred to as of paramount importance, especially that no vital part of the work should be so delayed as to postpone the use of the system when the other parts were ready for service. Although this was quite obvious, it took rare courage on the part of the Chief Engineer to advise in the most emphatic manner the award of the large contract for the Ashokan Dam to a contracting

company, which had already demonstrated its capacity to carry out so large an undertaking quickly and satisfactorily, but whose proposal was 20% higher than the lowest bid, especially when that 20% meant somewhat more than \$2 000 000. Yet this was done, and the recommendation was adhered to, notwithstanding the storm of criticism to which he and the commission were subjected in the public press. It is true that such a course would be adopted by a railroad or business corporation, but in this case public funds were involved, and the plea that it was a war measure could not be advanced, and the guardians of the public interests are savagely critical of any suggestion that an additional price be paid to secure prompt performance, even though such a course might result in an ultimate saving, to say nothing of promptly meeting an urgent public need. The recommendations of the Chief Engineer prevailed, and the soundness of his judgment was fully demonstrated by subsequent events.

Great technical skill in design, however, even when coupled with capacity to plan an organization to execute efficiently, may not produce the desired results, in the absence of certain human qualities which stimulate enthusiasm and promote good team work. Fortunately, Mr. Smith possessed these qualities in a conspicuous degree. Not only was the plan of organization admirable, but rare judgment was shown in the selection of the department and division engineers. Under them came a large number of engineers, whom it was necessary to take from civil service eligible lists; but all down the line were to be found the same keen interest and pride in their work which were shown by the chief and his principal assistants. What was it that compelled this keen interest and loyal devotion to the work in hand? It was the feeling that the Chief Engineer had a personal interest in the men as well as in the work. It was the conviction that whatever credit might come from successful performance would not be monopolized by the chief, but would be shared by every man who contributed to that success. If any subordinate engineer was placed in charge of a part of the work involving special difficulty, or in which novel methods were used, there was no prohibition against his talking or writing about it. On the contrary, he was encouraged to do so.

Owing to the great extent and variety of the work, one whose duties were confined to a particular locality or a special problem might have a very hazy idea as to what was going on at other points and an inadequate comprehension of the project as a whole. To overcome these limitations, illustrated talks, descriptive of the work at certain points, were given to groups of men employed on other sections, with the result that every one who cared to acquire a knowledge of the work as a whole was enabled to do so.

But the Chief Engineer of so great an undertaking must deal with many others besides his own engineering staff, and in these relations

there is need of the exercise of diplomacy combined with firmness, insistence on rigid enforcement of obligations, coupled with absolute fairness and shrewdness, as well as kindness. To what degree these qualities were shown will, doubtless, be indicated by another speaker.

And then there is the impression which Mr. Smith has made upon his fellow engineers, the men to whom I have the honor of speaking, men who may not have had any direct connection with the great work with which he has been so closely identified, but who have taken a keen professional interest in it. May I not draw from one of the ingenious methods used in that work, and to which reference has already been made, a very simple illustration? As the acid traced upon the inner surface of the glass tubes inserted in the borings under the Hudson a line which indicated the direction in or the directness with which they were being driven, so, in our association with this master builder, there has been clearly etched upon our consciousness a distinct mark, and that mark has been always a level line—a level head, a warm heart, high ideals, and Yankee shrewdness—a combination as rare as it is admirable.

Of the work of the engineer, Professor Tilden of Johns Hopkins University, in a delightful essay on the "The Romance of Engineering", says: "The dominant note is the spirit of service, the recognition of a public need and a striving to fill it." To-day, as never before, the engineer, with whatever branch of the profession he may be identified, is being afforded an opportunity for service—service to his city, service to his country, service to civilization. On the service flag of the Engineering Profession, indicating the part they are taking in the great struggle for justice and righteousness on which the eyes of the world are now focused, are many thousands of bright, blue stars. Some of them are shining more and more brightly; some are growing pale and dim, and will soon be effaced by clouds, but, higher up on the flag, they will soon be replaced by the glowing, golden stars of sacrifice. Whether blue or gold, they tell the story of devoted service.

Mr. Smith, permit me, on behalf of your fellow engineers, to offer you our heartiest congratulations upon the tribute which is being paid to you to-night. Many honors have lately been bestowed upon you, none of which, we think, will be more highly prized than this. We want to share the gratification which it will bring to you.

And, gentlemen of the Board of Award of the John Fritz Medal, permit me, also on behalf of Mr. Smith's professional friends, to assure you that we believe that your selection of the recipient of the medal for 1918 was a wise one.

THE CHAIRMAN.—I know that I express the feelings of all present when I say that it is very fortunate that we have chosen Mr. Lewis to deliver this address. As an engineer, I feel very proud that we have

one among us who can produce an address with so much literary charm and so worthy of being preserved.

The next speaker will be the Hon. A. T. Clearwater, who will give an expression of appreciation of our Medalist from the standpoint of a public man, a jurist, a lawyer, and a citizen of New York, who has attended, as a member, two of the Constitutional Conventions of this State.

I know that we will all be very greatly edified and interested in hearing the appreciation which will be delivered by Judge Clearwater.

A. T. CLEARWATER.—Ladies and Gentlemen: I was informed by the Committee of Arrangements that the address of the evening was to be delivered by my friend, Mr. Lewis, and a statement, or rather a résumé, of what he was to say was forwarded to me; but, in writing to me and inviting me to come here, the Committee stated that it was desired to present to the engineers of these various associations a typical Catskill mountaineer; and in looking around in the recesses of the Catskill Mountains for a typical mountaineer, I was selected. So you see, in my person, and venturing into this gilded metropolis, a shy and unwonted visitor from these mountain streams, which have been so successfully dammed—in so many senses dammed—by my distinguished friend, the honored guest of the evening, J. Waldo Smith.

The Committee sent me a brief of what Mr. Lewis would say, and when I looked over the list of the attributes of Mr. Smith to which Mr. Lewis was to devote himself, I saw that there was nothing left for me to talk about except the cutting of the first tooth of Mr. Smith, and an account of his various amatory exploits before he settled down into a sober-minded Benedict.

When I took up the subject of cutting his first tooth, I tried to find the nurse who officiated on that important occasion. I found that she was still so youthful that she was endeavoring to teach the soldiers of France and England to cut a new set of teeth on the Western Front; and when I took up the subject of Mr. Smith's amatory exploits, I was so deluged with information that I gave up the attempt with sorrow, heartbroken to feel that I could not do justice to them.

Now, this is a much more solemn occasion that I had anticipated it would be. In the Catskill Mountains when we decorate a man, we always treat it as a joyous occasion. We do not treat it so solemnly as I find this; and yet, after all, it is a great occasion in a man's life, and a great occasion in the history of these organizations that combine to decorate him and to bestow upon him this medal, the great embellishment of the engineering world. It is a singular coincidence that of the recipients of this medal, I have known but the first and the last. It was my good fortune to know Lord Kelvin, the first recipient, and with him and the Chinese Ambassador to the United States, Dr. Wu Ting Fang, I was at Niagara Falls at the time of Lord

Kelvin's visit there, which was the occasion of the operation of the installation at that place of turbines for the generation of electric energy by falling water. I have seen much water diverted from its natural course since the time I visited Niagara Falls with Lord Kelvin. I have seen much of the water which should be drunk in Ulster County sent down to this thirsty city by the distinguished guest of to-night; and I suppose that we shall be dry in Ulster for generations to come, because of the labors of your guest, which entitle him to this medal of distinction.

I have known him ever since he dawned above the horizon of the Catskills. I have differed with him upon many, many occasions. I expect to differ with him upon many, many to come. I am utterly unable to recall since I first met him, before the Legislature of the State of New York in 1905, down to this time, the 17th of April, 1918, when we have been able to agree upon a single question.

Therefore, by the philosophy of contradictions, by the law of differences, have I the antipodal attraction, as it were.

I am brought here from my modest home in the mountains, the mountain roads and the mountain streams which are the tributaries of the Esopus, to assist in paying this tribute to him to-night. And yet, notwithstanding these differences, you will be surprised—some of you will be shocked—I know, to hear me say that I have a great admiration for him, an admiration predicated upon his sterling character, his great scientific attainments, the scientific attitude, the intellectual detachment, the desire to be sure, and to be right, which has characterized his conduct as the Chief Engineer of this colossal work.

Even in the Catskills, we do not live the life of the Garden of Eden, and you may be surprised to know that up along the trout brooks there are sources of unhappiness, of discontent, and that some of us are foolish enough to believe that we would be better off if we were in New York, in the thirst, and the dust, and the dirt of this town. I am not one of those. I am content with war rations and undiverted Esopus water. Therefore, it is that I speak with the greater freedom. I have known the members of this Board of Water Supply. I see in this audience my distinguished friend, the Hon. Charles Strauss, who was Chairman of the Board until a few days ago; until, in one of those spasms of economic reform which sometimes possess the souls of good men, he was tempted to resign—a most unwise proceeding, and I fancy a most unhappy proceeding for the taxpayers of New York.

Some of you read the Bible, or have read it, and doubtless remember about the swarms of locusts that descended upon the fields of Egypt. They were as nothing compared to the swarms of engineers which overspread the Catskills. You could count the locusts of Egypt, but you could not count the engineers that came up to the

Catskills to take our water. The chief among them was Mr. Smith, and all the maledictions, all the vindictive ejaculations, were hurled upon his devoted head; and the astonishing thing is that he survived it all, and that he looks so well and so handsome to-night, as he comes here to receive the crowning reward of his labors.

The characteristics of Mr. Smith's efforts have been exactness, accuracy, and veracity. Now, those are virtues which we treasure in the mountains. I am a stranger in this town. I read the newspapers; I fancy, as I read them, and the editorial comments, that you do not cultivate the great virtues of accuracy, and industry, and veracity here. Perhaps that is an error; but, when Smith came up to Ulster, those were the virtues that characterized his conduct. That is why I am here, because it was the only thing we had in common.

They mapped out, under his tutelage, in the mountains, the property of every person whose holdings were condemned for this vast reservoir, covering miles. I think, 13 villages, 27 churches, 42 school houses, 36 cemeteries, all sorts of factories, all sorts of industries; and it was part of my duty, as a Catskill Mountain lawyer, to investigate the accuracy of those surveys, because surveying in the mountains is one of the great mysteries. To you engineers, surveying is as simple as A-B-C, but to us, in the mountains, there was a constant belief at first that the engineers, in making their surveys, were always allotting to the property owner less land than he had, always trying to "turn sharp corners", and surveying into their maps property which they did not intend to pay for.

Well, after I had investigated several hundred, made under the management of Mr. Smith—of the several thousand that were made—and had failed to find a single inaccuracy in any one of the surveys, I came to the conclusion that after all, when his job was over, he might be entitled to the John Fritz Medal.

And another thing. You know, up in the country, we have more time to discuss the problems of statecraft than you have here. You live so hurried a life; you are so devoted to pleasure; you give such scant attention to the higher ideals of existence, that you are unaware how essential tact and diplomacy are in dealings with your fellow-men, and particularly in dealings with your fellow-women. This man is a wonderful diplomat. I know of no man in the circle of my acquaintance who would be a better representative at the court of an oriental despot than our friend Mr. Smith. He has that singular faculty of never seeming to insist upon his own way, and of getting his own way every time that he starts out to get it. Now, is not that the first quality of a diplomat, and has it not been one of the crowning features of his career?

And he has attained it, without—as Machiavelli, as Rochefoucauld, as Voltaire, and as Rousseau have all said—he has managed to attain

it without lying; and you will remember that they all said that a diplomat was a man sent abroad to lie for the benefit of his country. We have been able to rely upon what he said—I will not say that he said very much. I think I might say that a subdued reticence was the great characteristic of his conversation; but what he did say was reliable.

Something has been said, not by me, but my friend Mr. Lewis, as to his courage, particularly his courage in advocating the letting of the contract for the great Ashokan Reservoir to a firm of contractors of established reputation at a price 20% in excess of the lowest bidder for that contract. Under his advice this contract was let to Winston and Company, composed of James O. Winston and Thomas Winston and my charming friend, Jules Breuchaud.

Among my other activities, an activity which I do not regret, and I am sorry to say that in my advancing years—and I am so old that it is generally believed that I am at least 250 years old—you may not know it, but it is an absolute fact that when they celebrated the 250th anniversary of my town in 1908, it was generally conceded that it was a celebration of my own 250th birthday; so that I have long lived there, and know the traditions of the mountains—and among my activities which I do not regret is the fact that I have to some extent been the advisor of these contractors from the time they took this contract under the approval of Mr. Smith down to this day.

While I have been at the bar 42 years—for 27 of which I was connected with the Department of Justice, Prosecuting Officer, County Clerk, Justice of the Supreme Court—during that entire time I have never known any more scrupulous men than these contractors, Winston and Company. They have done exactly as they agreed to do with the City of New York, and more than they agreed to do. They have had the approval, all the way through, of the Chief Engineer of this Board, Mr. Smith; and, as Mr. Lewis well said in his address to you, subsequent events absolutely justified the attitude and determination of Mr. Smith in awarding the contract to that firm; and it was through their co-operation and his superb planning of the whole scheme that the City of New York has this supply of abundant, pure, sparkling water to-day.

Now, except the engineers here, Mr. Smith, Mr. Honness, Mr. Breuchaud, and Mr. Strauss—you know nothing about the wonderful character of this water. I had occasion recently to examine the most distinguished geologists in this hemisphere—Grabau, of Columbia; Merrill, of Yale; Burrell, of Washington; Clark, of New York—particularly as to the age of the Catskill Mountains. I found that they were even older than the Board of Water Supply.

There are two schools of thought regarding the geological formation of the Catskill Mountains, one that they are the result of sedimentary deposits, the other maintains that they are the result of the erosion of the ice cap, as it came down from the mountains of the North. It was agreed by all that these mountains are 300 000 000 years old. It was also agreed that there was no impure or polluting element in this water from the old Devonian formation, entirely above any carbonaceous deposit; above iron, coal, copper, zinc, lead.

Therefore, this water, which you get from the Ashokan Reservoir, the site or location of which was selected by this Chief Engineer, comes over this old sandstone bed, and comes down to you pure, free from any possible pollution. You realize what a beneficial thing that is for New York; no typhoid fever, no germs, no bacteria, no protoplasmic substances to interfere with the advance of this great wave of prohibition which is sweeping over the country. It will supply you all with every needful drink.

What does it mean to you that you should have such a supply? You owe its selection to this man, who is to get this decoration to-night. The John Fritz Medal is not a sufficient decoration. He ought to be elected the great, high panjandrum of the prohibitionists of the world.

This colossal work required a wonderful intellectual scope. It required more than mere mathematical ability. It required prescience, vision, imagination. It required the faculty to see from the beginning the completion of the great scheme; and that is given to few men in this world. There are many of us who can take a single task and execute it; but it is given to few of us to combine in our imagination and vision a grand scheme such as is involved in the creation of this Catskill Mountain water supply. I suppose that those of you who have not been up there will go, and there you will see a natural reservoir formed by ranges of mountains, this stream coming down over this old red sandstone bed, gathered into this vast basin, with its one hundred and sixty-six billions of gallons of water; and in a few years you will see the Schoharie River, diverted from its channel, carried through the Catskill Mountains into this reservoir to supply you with additional hundreds of millions of gallons of water per day, which you will need in the dozen years required to complete that tunnel.

This man planned it all. He had the foresight, the vision, to see it all in the beginning. Now you may not know that there were other sources of supply suggested before this scheme was decided upon. There was talk of diverting the waters of the Hudson River in the vicinity of Kingston—a town that I sometimes visit when I venture out of my mountain fastness—and carrying that down here, and filtering it and supplying it to New York. The Hudson River has become little more than a sewer, and that plan was abandoned because the water was not suitable.

The Adirondack Mountains were talked of; a vast chain of lakes, but the distances were too great; the transparent waters of Lake George and Lake Champlain, but they were too far away; a river in Connecticut, but that was barred because it was taking the waters from another State; New Jersey was spoken of; and, at last, our friend here, with his associate engineers, decided upon the Ashokan Valley as the place where this dam and reservoir should be constructed.

Have you engineers seen the great reservoirs of the world? Many of you, I take it, have seen the great aqueducts of the Romans. Mr. Lewis has said that we build our aqueducts under the ground. The Romans built their aqueducts above the ground. There are remains of Roman aqueducts in Germany, in France, and other countries. They were all above ground, subject to the influences of the elements and of decay, and they exist only in isolated, broken patches, as it were.

An aqueduct above the ground was spoken of, a structure like the aqueduct above High Bridge—the old aqueduct carrying the water of the Croton River—which is built after the style of the ancient Roman aqueduct across the Campagna.

The siphon carries the water under the Hudson River, as described to you by Mr. Lewis, a great work due to our distinguished friend. It would be a labor of joy to paint the other side of the picture. I should be glad; it would be a great opportunity for me to relate here—I hope, to a sympathetic audience—my disagreements with this gentleman. I do not want you to think that I love him without limitation. I want you always to remember that I have in my mind, the great Aristides of Athens.

You will remember that Aristides was so praised for his good works and just conduct that the Athenians grew tired of hearing his praises. They pulled down his monument in the market place (as we pulled down the monument of Frederick the Great at Washington the other day) and exiled him because he had been praised so highly; and I do not want to go so far in the praise of this man that you will treat him as the Athenians treated Aristides.

You all have seen the Cathedral of St. Paul's in London, built by the great architect, Sir Christopher Wren. When it was proposed that they build, in place of the statue of Queen Anne in the Plaza in front of St. Paul's, a monument to Sir Christopher, it was suggested by the Mayor and the Commonalty of the City of London that they put an inscription on that cathedral which would surpass in dignity, and in a lesson to posterity, any monument which they might devise or erect; and they placed on the walls of St. Paul's an inscription which might well be placed on the Ashokan Dam to the memory of Mr. Smith: *Si Monumentum Requiris, Circumspice*.

THE CHAIRMAN.—Now, after these two eloquent addresses, the presentation of the medal itself will take place. The medal will be

presented by Mr. Ambrose Swasey, Past-President of the American Society of Mechanical Engineers, Founder of the Engineering Foundation, and agreed by all to be the Dean of the Engineering Profession in America. After the presentation of the medal there will be a response by the medalist, Mr. J. Waldo Smith.

AMBROSE SWASEY.—Mr. Chairman, Ladies and Gentlemen, and Friends: We are always glad of the opportunity of taking some part in honoring those who have won distinction as we journey along together through life, and these occasions for the presentation of the John Fritz Medal have been especially gratifying to us and inspiring, for the recipients of the medal have been men of noted achievements in science and in industry, men we have loved to honor, and men from whom we have greatly enjoyed receiving their expressions of appreciation.

I remember, when traveling in the Far East, receiving a letter from Sir William White, shortly after he had been informed by Mr. Hunt, who was then Secretary of the Board of Award, that the John Fritz Medal had been awarded to him.

In the letter Sir William said "I count it as one of the greatest honors that has ever been bestowed upon me by my professional brethren."

Surely, friends, in honoring this man we have honored ourselves. And, now, J. Waldo Smith, the John Fritz Medal Board of Award, because of your standing as a man, and your high character, because of your achievements as an engineer, have awarded you this medal, and having been the Chairman of the Board at the time the award was made, it is indeed a pleasant duty and a great privilege for me, on behalf of the Board, to present this medal to you, together with this diploma; and may I add, it is my hope, which I am sure is shared by all those who know you, and know of you, that for many years you may continue in the splendid work in which you have been engaged for the advancement of civilization and for the benefit of humanity.

J. WALDO SMITH.—Col. Carty, the Committee, Guests, and Assembled People: As I sat here and listened to the fluent and persuasive speakers, I wished that I might attain, for a minute or two, a state of mind where I could believe that all the complimentary things that they have said were deserved; but I fear they have viewed this undertaking through glasses tinted with the color of the morning, and from too favorable a standpoint.

However, it is idle for me to pretend that I am not deeply moved with the tribute of this meeting. I would be insincere were I to create the impression that I am not most grateful for the generous, gracious words of this talented scholar and distinguished jurist from Ulster County, and of the ranking engineer of the City of New York

in commendation of the work accomplished. For the very beautiful and artistic medal, typifying the highest honor in the gift of engineers, I am profoundly grateful and appreciative. I shall never cease to be filled with wonder and surprise that I was chosen for this honor, a wonder which only grows with consideration of the previous recipients.

On the other hand, it gives me great pride, joy, and happiness to think that it is an honor in which very many others can rightfully claim a large share. Some are in this room; some are serving the Government in its present-day vital activities; and some are in a far country fighting the battles of their nation and of humanity. It would be the height of presumption to assume that this medal was not intended as a recognition of the construction of the Catskill Water Supply, and of the work of all those who have contributed to its success, and I do so consider it.

It was my privilege to know that grand old man in whose honor the medal was founded, to have been privileged even to call him Uncle John, to contribute to the fund, and to take part in that meeting on August 21st, 1902, at which the first medal was presented to John Fritz. That date marked the first formal co-operation of the four national societies, a movement of slow growth, with many disappointments, but always tending toward closer union.

The United Engineering Society has, so far as its occupancy of this building is concerned, held three of these engineering societies together. The establishment of the Engineering Foundation, through the great generosity of Mr. Swasey, was a long step in advance, perhaps the longest, that has been taken to date. The formation, during the last year, of the Engineering Council, of which so much was expected, adds another bond of fellowship; and now, that great and influential organization, the American Society of Civil Engineers, has given up its exclusiveness, and has joined in the occupancy of this building. So, with the four national societies housed under one roof and joining in the use of a common library, the opportunity is afforded of closer relations.

The time is opportune, and the need never was greater. How this may be brought about is one of the questions that deserves the most careful consideration. Possibly the solution of a closer union lies in an Institute of Engineers, or an American Society of Engineers with chapters for the various branches of engineering, and a strong, centralized government through which a proper co-ordination can be effected.

But, more than all this, engineers should have more consideration for each other. They should not be so prone to condemn, but ever seek to be helpful, one to another. In this great and monstrous war, engineers, as individuals, are doing a wonderful work. They are found in every branch of the military service, and in all the activities of the

Government. Their services are being sought and recognized, and they are working together toward a common end and aim.

It seems to me that this unity of purpose should serve as an example to those who have not had the privilege of rendering direct service, and it should indicate to all technical men and engineers that inspiration to better things comes only through unity of organization, and that only through unity of purpose, forcefully expressed by accredited representatives, can the influence which they hold, be made significant and become a substantial fact.

The organization of more engineering societies, national in scope, is all wrong, and can result in no advantage. Progress can only be made through the present societies becoming increasingly more useful to their members and securing closer co-operation among themselves.

These are troublous times, and the future looks none too bright, but we view it with courage and confidence. It seems as if the entire universe were at war, with all the nations arrayed against each other. And what is it all about, what are we fighting for—the phrase has been used so much for the last year—"to make the world safe for democracy?" If this means that we are trying to force democracy as a form of government on the other nations, then we are just as despotic as the nations we are fighting against. Oh no. We are not fighting for this. We are fighting to make the world safe for ourselves and our successors; to keep the war away from our homes, our lands, and our people. We are fighting for liberty, right, and honor. We are fighting to avenge the unspeakable crimes that have been committed under the guise of an alliance with God. We are fighting to crush that despotism which knows no law but necessity, is guided only by the lust of conquest, and, by its alliance with the unspeakable Turk, has laid bare its adherence to every principle of pillage, murder, rape, and mutilation. We are fighting to establish and maintain that universal principle of humanity, the inherent right of every one brought into this world to life, liberty, and the pursuit of happiness. The force and power of elemental justice cannot be overcome. It will live forever. Our cause—the simple cause of humanity—must prevail, and we must and will win.

What shall be said of this splendid lot of men who have gone abroad, and of those who are preparing to go? They are leaving their homes and their families, and they are going cheerfully and eagerly to take their places in the line. These societies should be very proud of the record of their membership. Nearly fifteen per cent. are engaged somewhere in war service, and the number ever increases. Presumably this percentage holds good for the entire Engineering Profession. But in the many letters that I have received from abroad and many others I have read, there is an almost universal sentiment of fear expressed. Such a sentiment seems very strange to us who know these courageous,

splendid fellows who have gone away, and you may well ask of what are they afraid. Well, they are afraid that they may get in the thick of the combat. They fear that there may not be a full co-operation and co-ordination; that personal ambition and jealousy may create discord, so that the allied armies may not be able to put forth a concerted effort. They are afraid, too, that due to the machinations of the pacifists and the seeming inability of our people to agree on a programme to put every ounce of their effort toward its fulfillment, they will be handicapped by lack of material and equipment, and that their full effort cannot be exerted.

They fear more than anything else that there may be a negotiated and inconclusive peace before the inhuman invader is brought to a full realization of what wanton destruction, cruelty and outrage mean, by having his country invaded, and his cities and villages laid waste. The whole thought and ambition is that the power of despotism in the whole world must be broken and destroyed; and that the people, who individually work and give and make sacrifices shall be given the privilege of determining whether they shall or shall not be herded as slaves and driven to slaughter.

I presume every one who has had the privilege of being the principal executive officer in a large undertaking, and particularly when he has had the rare privilege of an absolutely fresh start and has brought together a new organization, has had or should have had certain hopes and ambitions. This was the case with us on the Catskill Aqueduct. It was our constant endeavor to encourage the highest degree of *esprit de corps*, as it was realized that this was the foundation on which the edifice of any successful effort must be constructed. We ever held in view the justice of giving to the engineer that proper recognition in compensation, position, and influence, which, measured by the results accomplished, was his just due. We sought always so far as possible to develop every man by thrusting responsibility on him, and at the same time not neglecting his guidance and instruction, we sought to keep out jealousy, and to secure from all the highest degree of co-operation and consideration, each for the other.

We tried to see that no part of this work was segregated or fenced about to the exclusion of men engaged on other parts of it, believing that to do so would result in lack of interest and appreciation of what it was sought to accomplish.

Believing that the contractor on a public work is just as much a partner of the undertaking as the engineer representing the governing authority, a firm effort was made throughout to establish a better working basis between the engineer and the contractors and their representatives. We thought that to work with them and not against them would secure a more perfect result, and, in the end, would avoid additional expense and litigation. In order that the elements of

doubt and uncertainty usually attending contract work should, to a great extent, be eliminated, it was our aim to make the preliminary investigations as thorough and complete as possible, and to prepare plans and specifications which should contain all available and pertinent information and be as complete and definite as our best thought and effort could make them, so that the contractors could prepare their bids intelligently and size up accurately the business risk involved.

All this was done with a view that competition would be stimulated, that better and fairer bids would be obtained, and that more satisfactory ultimate results and greater economy would be secured. I do not know how far these hopes have been realized. I do know that the realization is far less than the anticipation, but I am contented in the consciousness that an earnest effort was put forth and some success attained.

I beg the indulgence of this audience for a few moments longer to say just a word or two to my personal associates of these many years, who are here. There may not be another opportunity so favorable; and in this term "associates" I include very many, who, though they had no direct connection with the work, have yet been very helpful.

A very distinguished diplomat and author has, in a very few and simple words, expressed what I feel. It is this:

"When you attain that which you have desired, you shall think more of the kindness of your fortune than the greatness of your skill. This will make you grateful and willing to share with others what Providence has bestowed upon you. And truly this is both reasonable and profitable, for it is but little any of us would catch in the world were not our luck greater than our deserts."

I am not only willing, but I am glad, to share with others, and I would be most unhappy if I could not share any honor or credit which I have received, or may receive in the future with you. By chance, by the mere accidental turn of Fortune's wheel, which gave the opportunity, for opportunity is seldom if ever of our own making, it was my privilege to lead; but there was little, very little, I could do, except to encourage, to try to keep trouble away, so that you could all put forth your best efforts; at times perhaps to fight your battles. The most I could do was to say "yes" or "no" to propositions that you advanced, with the best information and advice which could be secured. It was inconceivable that the answer could always have been right, but any answer that is not fundamentally and intrinsically wrong is infinitely better than delay, and contributes far more to true efficiency and economy.

Individuals or groups of individuals in the organization have created or proposed all the new things, all the special features of the work. This naturally is the situation on most, if not all, large works; but possibly it is not always so freely admitted. Some bold

things have been done, of which nothing now can be said in detail, but for which credit is sure to come later. That credit is yours, and I want every one to know it is yours.

The whole underlying, fundamental reason of all the success is this cordial co-operation and consideration which each has felt for the other; and the fact that the administrative and executive bureaux have worked together and in perfect harmony and have believed in each other.

It is now 12 years and more since this association began, a quarter, or nearly a quarter, of one's useful life, and it is hoped that you have acquired something in these years that is going to help you in the future. It is hoped that every one will look back on these years always with pleasure, and that you have acquired through experience and association something which will help you upward as you go onward.

You will never know how much of thanks and gratitude I hold for the high degree of loyalty you always gave, and for the ability, vision, and talent you brought to the work.

Adjourned.

ANNOUNCEMENTS

The Reading Room of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

June 5th, 1918.—8.30 P. M.—A regular business meeting will be held, and a paper by L. R. Jorgensen, M. Am. Soc. C. E., entitled "Improving Arch Action in Arch Dams", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL CONVENTION ABANDONED

The Board of Direction has decided that the Annual Convention of 1918 shall be abandoned, on account of War Conditions. Among the reasons for this action are: the absence of many members of the Society in the service of the country; the inappropriateness of social functions at this time; the limitation of transportation facilities; and the advisability of the practice of economy along all lines.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction to the members who have made use of the resources of the Society in this manner has been expressed frequently, and leaves little doubt that if it were generally known to engineers that such assistance could be had, many would avail themselves of it.

On October 1st, 1916, the Library of the American Society of Civil Engineers ceased to exist as such, and was merged in the Engineering Societies Library, adding 67 000 volumes to the collection, which comprises also the former libraries of the American Institute of Mining Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, and now has a total of 133 000 volumes and pamphlets. Containing, as the Library now does, the special collections mentioned, its scope is broadened, and, as it receives an unusually large number of technical periodicals, it is well equipped to continue the service formerly rendered by the Society Library.

The Engineering Societies Library offers this service at a cost which is trifling compared with the value of the time of an engineer who personally looks up such matters, and the work can be performed

quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

It sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the Library is prepared to furnish photographic copies of the material at a small price per page. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

The Library is also able to provide translations of articles in foreign languages when desired.

Requests for searches, copies, translations, etc., should be addressed to the Director, Engineering Societies Library, 29 West 39th Street, New York City, who will gladly give information concerning the charges for the various kinds of service.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 35 of the Year Book for 1918.

**LOCAL ASSOCIATIONS OF MEMBERS
OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS**

San Francisco Association, Organized 1905.

Jerome Newman, President; Nathan A. Bowers, Secretary-Treasurer, 502 Rialto Building, San Francisco, Cal.

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 p. m., at the Palace Hotel, on the third Tuesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at noon, every Wednesday, at the Engineers' Club, 57 Post Street, where special tables are reserved for members and guests of the Association.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

Colorado Association, Organized 1908.

Robert Follansbee, President; L. R. Hinman, Secretary-Treasurer, 1400 West Colfax Avenue, Denver, Colo.

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesday at 12.30 p. m., at Daniels and Fisher's.

Visiting members are urged to attend the meetings and luncheons.

Atlanta Association, Organized 1912.

B. M. Hall, President; W. C. Spiker, Secretary-Treasurer, 1408 Candler Building, Atlanta, Ga.

Baltimore Association, Organized 1914.

Mason D. Pratt, President; Charles J. Tilden, Secretary-Treasurer, The Johns Hopkins University, Baltimore, Md.

Cleveland Association, Organized 1914.

Harry Fuller, President; George H. Tinker, Secretary-Treasurer, 516 Columbia Building, Cleveland, Ohio.

Detroit Association, Organized 1916.

T. A. Leisen, President; Clarence W. Hubbell, Secretary, 2348 Penobscot Building, Detroit, Mich.

The regular meetings of the Association are held on the second Friday of December, April, and October, the last being the Annual Meeting.

District of Columbia Association, Organized 1916.

A. P. Davis, President; John C. Hoyt, Secretary-Treasurer, U. S. Geological Survey, Washington, D. C.

Duluth Association, Organized 1917.

F. E. House, President; Walter G. Zimmermann, Secretary, Wolvin Building, Duluth, Minn.

The regular meetings of the Association are held at noon on the third Monday of each month (usually at the Kitchi Gamma Club), with luncheon, followed by a short business session and the reading of papers. Visiting members of the American Society of Civil Engineers can secure from the Secretary definite information relating to the meetings, at which they will be welcomed. The Annual Meeting is held on the third Monday in May.

(Abstract of Minutes of Meeting)

April 15th, 1918.—The meeting was called to order; President F. E. House in the chair; Walter G. Zimmermann, Secretary; and present, also, 18 members.

The Committee on Organization of a Duluth Engineers' Society, W. H. Hoyt, Chairman, reported that a preliminary meeting for discussion relative to the organization of the proposed society would be held on Monday evening, May 20th, 1918, at a dinner at the Kitchi Gamma Club, to which all members of the four National Societies are to be invited.

On motion, duly seconded, the Committee on Publication of Papers was instructed to have copies of all papers to be presented before the Association ready for distribution at the meetings at which such papers are to be read, in order to facilitate discussion.

A paper by Lyonel Ayres, City Engineer of Duluth, entitled "Paved Highways" was presented by the author.

Adjourned.

Illinois Association, Organized 1916.

A. S. Baldwin, President; Edgar S. Nethercut, Secretary-Treasurer, 705 Michigan Ave., Evanston, Ill.

The regular meetings of the Association are held on the second Monday of March, June, September, and December, the last being the Annual Meeting. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Louisiana Association, Organized 1914.

W. B. Gregory, President; Charles W. Okey, Secretary, Tulane University, New Orleans, La.

The regular meetings of the Association are held at The Cabildo, New Orleans, La., on the first Monday of January, April, July, and October.

Nebraska Association, Organized 1917.

George L. Campen, President; Homer V. Knouse, Secretary-Treasurer, 115 City Hall, Omaha, Nebr.

Regular meetings of the Association are held on the first Saturday of each month, except July and August, and at such places as may be appointed from time to time by the Executive Committee. The Annual Meeting is held in Lincoln, Nebr., on the second Friday in January.

An "Engineers' Round Table" is reserved daily for luncheons, at Courtenay's Restaurant, 17th and Douglas Streets, Omaha, to which all engineers are invited. Visiting members of the Society are especially urged to communicate with the Secretary when in the city.

Northwestern Association, Organized 1914.

P. E. Thian, President; Ralph D. Thomas, Secretary, 508 South First Street, Minneapolis, Minn.

The meetings of the Association are held bi-monthly, alternating between St. Paul and Minneapolis, on the third Friday of each month. Information as to the time and place of such meetings will be furnished on application to the Secretary.

Philadelphia Association, Organized 1913.

Henry H. Quimby, President; C. W. Thorn, Secretary, 1313 South Broad Street, Philadelphia, Pa.

The regular meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street, on the first Monday in January, April, and October, the last being the Annual Meeting.

Pittsburgh Association, Organized 1917.

Richard Khuen, Jr., President; A. B. McGrew, Secretary-Treasurer, 2111 Farmers Bank Building, Pittsburgh, Pa.

The Annual Meeting of the Association is held on the first Monday in October. The time and place of other meetings are not fixed, but this information will be furnished on application to the Secretary.

Portland, Ore., Association, Organized 1913.

Philip H. Dater, President; C. P. Keyser, Secretary, 1147 East Yamhill Street, Portland, Ore.

St. Louis Association, Organized 1888 (Constitution Approved by Board, 1914).

J. A. Ockerson, President; C. M. Daily, Secretary-Treasurer, 34 East Grand Avenue, St. Louis, Mo.

The Annual Meeting of the Association for the election of officers and for the transaction of business, is held on the fourth Monday in November. Two meetings each year, for the presentation and discussion of technical papers, are held in the Auditorium of the Engineers Club of St. Louis and are open to members of the Associated Societies. Other "get-together" meetings are held regularly for dinner or luncheon on the fourth Monday of each month except July, August, and November.

(Abstract of Minutes of Meeting)

April 29th, 1918.—The meeting was called to order at the American Hotel, at 6.30 P. M.; President Ockerson in the chair; C. M. Daily, Secretary; and present, also, 21 members and guests.

The minutes of the preceding meeting were read and approved.

A communication from the American Association of Engineers asking for data on the Society's activities in war, employment for members, education for engineering students, and its publicity programme, was read by President Ockerson, who was requested to reply to the communication.

Professor W. E. McCourt addressed the meeting on "War Materials and War Minerals."

The work and organization of the National Engineering Council and the variety of work which comes before it, were described by Mr. Philip N. Moore.

Mr. Edward E. Wall reported on the meeting of the Board of Direction of April 16th, 1918.

Adjourned.

San Diego Association, Organized 1915.

N. B. Kellogg, President; J. R. Comly, Secretary-Treasurer, 4105 Falcon Street, San Diego, Cal.

Seattle Association, Organized 1913.

A. S. Downey, President; Phil. A. Franklin, Secretary, Care, City Engineer's Office, County-City Building, Seattle, Wash.

The regular monthly meetings and luncheons of the Association are held at the Frye Hotel, 3d Avenue and Yesler Way, at 12.15 P. M., on the last Monday of each month. All members, in any grade, of the American Society of Civil Engineers are cordially invited to attend the meetings when in the vicinity.

Southern California Association, Organized 1914.

Louis C. Hill, President; H. W. Dennis, Secretary, Edison Building, Los Angeles, Cal.

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-monthly meetings with banquet, at Hotel Clark, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M., every Thursday and the place of meeting may be ascertained from the Secretary.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association, Organized 1914.

J. C. Ralston, President; B. J. Garnett, Secretary, City Hall, Spokane, Wash.

The regular meetings of the Association are held on the second Friday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary.

Visiting members are invited to attend the meetings and luncheons.

Texas Association, Organized 1913.

R. C. Gowdy, President; J. H. Brillhart, Secretary, Care, Mosher Mfg. Co., Dallas, Tex.

(Abstract of Minutes of Meeting)

March 9th, 1918.—The meeting was called to order at the University Club, Dallas, Tex., at 10.30 A. M.; First Vice-President R. C. Gowdy in the chair; J. H. Brillhart, Secretary; and present, also, 17 members.

The reading of the minutes of the previous meeting was waived. The following candidates were elected to membership: Messrs. J. L. O'Hearn, C. E. Washburn, H. E. Burns, E. L. Myers, Charles Saville, and F. L. Chase.

On motion, duly seconded, the report* of the Committee on the Relations of Local Associations to the Parent Society, etc., was ordered read and discussed. The following report with amendments was adopted:

"The Relations of Local Associations.

"*Initiation.*—It is the sense of this meeting that the Rule be approved. Carried.

"*Constitution and By-Laws.*—It is the sense of this meeting that this Rule be approved; especially recognizing the authority granted to Local Associations to exercise their influence in properly solving Public Engineering Problems, not of a national character. Carried.

"*Reports.*—Approved. Carried.

"*New Members.*—It would seem best to word this Rule so that Local Associations may investigate and officially report on candidates for admission, and must do so if the Secretary of the Society so requests. Carried.

"*Restriction in Activity.*—Approved. Carried.

"*Ethics.*—Moved, seconded, and carried that recommendation of National Association (regarding Ethics) be approved. The Board of Directors of this Local Section are hereby granted authority to act as the committee of investigation appointing sub-committee if necessary. Carried.

"*Grievances.*—Approved. Carried.

"*Co-Operation.*—Approved. Carried.

"*Local Societies.*—Approved. Carried.

"*Engineers.*—Approved. Carried.

"*Relations of Local Societies to the Public.*—Approved. Carried.

"*Local Affairs.*—Carried.

"*State Affairs.*—Carried.

"*Rebate.*—It is the sense of this meeting that the Parent Society be and hereby is, requested to remit to the Treasury of this Association annually, an amount equal at least to 20% of the annual dues paid to the Parent Society by individual members of this Section. Carried."

On motion, duly seconded, the verbal report of the Treasurer was accepted, and he was ordered to make a full written report in the minutes of this meeting.

* This report was published in May, 1917, *Proceedings*, p. 327.

On motion, duly seconded, the Secretary was ordered to compile an Honor Roll of members of the Association in the Service, including those on the Reserve List.

On motion, duly seconded, it was decided to select a city to be the permanent headquarters of the Association, where the Secretary may have an office, and that the Board of Directors be instructed to designate such city as the place for holding the Annual Meetings of the Association, it being understood that if, in the opinion of the Board, it is imperative to designate another city, authority to make such change is hereby authorized.

On motion, duly seconded, it was decided that, until due notice to the contrary is given by the Board of Directors, the Association shall continue to hold regularly its annual and semi-annual meetings.

On motion, duly seconded, the Secretary was ordered to mail a notice to all members of the Association, except those in active military service, relative to the payment of the annual dues, and to make a full report on the subject at the next general meeting.

The following officers were elected: R. C. Gowdy, President; R. J. Potts, First Vice-President; Hans Helland, Second Vice-President; and J. H. Brillhart, Secretary-Treasurer, with the understanding that Dallas is to be the headquarters of the Association. Messrs. C. H. Chamberlin and J. M. Howe automatically became members of the Board of Directors.

On motion, duly seconded, the dues of all members in active military service were remitted during their period of service.

After a Progress Report by Mr. J. C. Nagle on the activities of the Legislative Committee had been presented, it was moved and carried that the Committee be continued, and that two more members, to be named by the President, be added to it.

On motion, duly seconded, the Secretary was instructed to write a letter of thanks to the officers of the University Club for the use of its rooms.

A paper by Mr. R. G. Tyler, entitled "Purification of Sewage by Aeration in the Presence of Activated Sludge", was presented by the author, and the subject was discussed by Messrs. Nagle, Saville, Myers, Bartlett, and Love.

Maj. W. P. Rothrock, of the Quartermaster's Department, U. S. A., addressed the meeting on the construction of Camp Logan, at Houston, Tex.

A paper by Mr. C. T. Bartlett, entitled "Some Considerations Concerning Stream Run-off in Relation to Rainfall", was presented by the author, followed by discussion by Messrs. Nagle, Love, Chamberlin, and Tyler.

On motion, duly seconded, a vote of thanks was extended to the Local Committee for courtesies extended.

Adjourned.

Utah Association, Organized 1916.

George L. Swendsen, President; H. S. Kleinschmidt, Secretary-Treasurer, 306 Dooly Building, Salt Lake City, Utah.

The Annual Meeting of the Association is held on the first Wednesday in April. The time of other meetings is not fixed, but this information will be furnished on application to the Secretary.

**PRIVILEGES OF ENGINEERING SOCIETIES
EXTENDED TO MEMBERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Electrical Engineers, 25 West Thirty-ninth Street, New York City.

American Institute of Mining Engineers, 25 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 25 West Thirty-ninth Street, New York City.

Associação dos Engenheiros Civis Portuguezes, Lisbon, Portugal.
Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 176 Mansfield Street, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, Public Library, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniørforening, Amaliegade 38, Copenhagen, Denmark.

Detroit Engineering Society, Detroit Board of Commerce Building, Detroit, Mich.

Engineering Association of Nashville, Commercial Club Building, Nashville, Tenn.

Engineering Association of New South Wales, 5 Elizabeth Street, Sydney, New South Wales, Australia.

Engineering Societies Club of Hawaii, E. F. Cykler, Secretary, Honolulu, Hawaii.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, 6 West Eager Street, Baltimore, Md.

Engineers' Club of Kansas City, Robert S. Beard, Secretary, Third Floor, City Hall, Kansas City, Mo.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Club of Trenton**, Trent Theatre Building, 12 North Warren Street, Trenton, N. J.
- Engineers' Society of Northeastern Pennsylvania**, 415 Washington Avenue, Scranton, Pa.
- Engineers' Society of Pennsylvania**, 31 South Front Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 568 Union Arcade Building, Pittsburgh, Pa.
- Florida Engineering Society**, J. R. Benton, Secretary, Gainesville, Fla.
- Institute of Marine Engineers**, The Minories, Tower Hill, London, E., England.
- Institution of Civil Engineers**, Great George Street, Westminster, S. W., London, England.
- Institution of Engineers of the River Plate**, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.
- Memphis Engineers' Club**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Mont.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oregon Society of Civil Engineers**, Portland, Ore.
- Pacific Northwest Society of Engineers**, 803 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingenieurs Civils de France**, 19 rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Southwestern Society of Engineers**, C. E. Barglebaugh, Secretary, 703 First National Bank Building, El Paso, Tex.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18-1, Copenhagen, Denmark.

Vermont Society of Engineers, George A. Reed, Secretary, Montpelier, Vt.

Western Society of Engineers, 1735 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE ENGINEERING SOCIETIES LIBRARY

(From April 1st to May 1st, 1918)

DONATIONS*

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

ELECTRICAL MEASUREMENTS:

A Practical Handbook Covering the Design and Construction of Measuring Instruments and Their Uses in Measurement of Current, Resistance, and Commercial Power, with Special Reference to Watt-Hour and Maximum Demand Meters. By O. J. Bushnell and A. G. Turnbull. Chic., American Technical Society, 1914. 171 pp., 139 illus., 2 pl., 8 x 6 in., cloth. \$1.00.

The aim of the authors has been to supply an adequate description of the instruments and methods used for the measurement of electrical energy, and to show by diagrams exactly how meters should be connected under all conditions.

RADIO-TELEPHONY.

By Alfred N. Goldsmith. N. Y., The Wireless Press, Inc. (copyright 1918). 247 pp., 226 illus., 9 x 6 in., cloth. \$1.25.

The author has attempted in this work to give a full description of present methods of radio-telephony and of the various types of apparatus used. The first systematic exposition of the subject to appear since 1907.

POWER STATIONS AND TRANSMISSION:

A Comprehensive Treatise on Electric Power Station Equipment, Design, and Management, and the Erection and Maintenance of Proper Transmission Lines. By George C. Shaad. Chic., American Technical Society, 1917. 180 pp., 50 illus., 3 pl., 10 tab., 8 x 6 in., cloth. \$1.00.

Presents concisely the important features of the topic. The treatment is largely descriptive and non-mathematical.

TEXT-BOOK OF ADVANCED MACHINE WORK:

Prepared for Students in Technical, Manual Training, and Trade Schools, and for the Apprentice and the Machinist in the Shop. By Robert H. Smith. 4th ed., rev. and enl. Bost., Industrial Education Book Co. (copyright 1916). 648 pp., 680 illus., 44 tab., 8 x 5 in., cloth. \$3.00.

A continuation of the author's "Principles of Machine Work". This volume treats of engine lathe work, drilling and boring machines, grinding, planing, milling, gear cutting, and tool making. Careful explanations are given for each variety of work.

MACHINE SHOP PRACTICE.

By William B. Hartman. N. Y. and Lond., D. Appleton & Co., 1917. 247 pp., 141 illus., 4 pl., 10 tab., 7 x 5 in., cloth. \$1.10.

A presentation of the elementary principles of machine shop practice, intended for the instruction of beginners. Mathematical calculations are confined to the use of simple arithmetic.

*Unless otherwise specified, books in this list have been donated by the publishers.

INTERNAL COMBUSTION ENGINE MANUAL.

By F. W. Sterling. 4th ed. Wash., R. Beresford, 1917. 168 pp., 10 x 6 in., cloth. \$2.00.

This manual, representing the course on internal combustion engines given at the United States Naval Academy, has been rewritten, enlarged, and brought up to date. It now covers the theory and practice of these engines without including mathematical demonstrations and formulas. Particular attention is given to the engines used by the Navy and to aviation engines.

GALVANIZING AND TINNING:

A Practical Treatise on the Coating of Metal with Zinc and Tin by the Hot Dipping, Electro-Galvanizing, Sherardizing, and Metal Spraying Processes, with Information on Design, Installation, and Equipment of Plants. By W. T. Flanders. N. Y., David Williams Co., 1916. 350 pp., 142 illus., 3 charts, 5 tab., 9 x 6 in., cloth. \$4.00. (Donated by the U. P. C. Book Co.)

Discusses the various processes in a practical way, describing the machinery, materials, and operations in detail. Intended as a guide in the installation and operation of galvanizing and tinning plants.

MECHANICS OF THE HOUSEHOLD:

A Course of Study Devoted to Domestic Machinery and Household Mechanical Appliances. By E. S. Keene. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 10 + 391 pp., 273 illus., 11 tab., 8 x 6 in., cloth. \$2.50.

This book is intended to be a presentation of the physical principles and mechanism used in the equipment that has been developed for domestic convenience. Equipment for heating, ventilating, water supply, sewage disposal, lighting, etc., is described.

AIRCRAFT MECHANICS' HANDBOOK:

A Collection of Facts and Suggestions from Factory and Flying Field to Assist in Caring for Modern Aircraft. By Fred H. Colvin. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 402 pp., 193 illus., 28 tab., 7 x 5 in., flexible cloth. \$3.00.

A manual of the best practice in inspecting, adjusting, and repairing airplanes, prepared for use by the machinists and riggers who are now being trained. Describes the construction, erection, and testing of the planes, the various engines in use, and the methods of caring for them. An account of the Canadian Training Camp at Borden is also given. Useful tables and a glossary are included.

AVIATION CHART:

Location of Airplane Power Plant Troubles Made Easy. By Victor W. Pagé. N. Y., The Norman W. Henley Publishing Co. [1918]. 46 x 32 in., paper. 50 cents.

A large chart outlining all parts of a typical airplane power plant, showing the points where trouble is apt to occur and suggesting remedies for the common defects. Intended especially for aviators and aviation mechanics on school and field duty.

MANUAL OF MILITARY AVIATION:

Prepared for the Use of Personnel of Aircraft Troops of the Army, National Guard, and Reserve Corps; Officers of the Army, National Guard, and Reserve Corps; Members of Military Training Camps; and Airmen in General. By Hollis Leroy Müller. Menasha, Wis., George Banta Publishing Co. (copyright 1917). 308 pp., 38 illus., 8 x 5 in., cloth. \$2.50.

Contains the theoretical information necessary for efficient military aviation service. Intended for use as a text-book and as a reference work.

METALLURGICAL CALCULATIONS.

By Joseph W. Richards. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 23 + 675 pp., tab., 10 x 7 in., cloth. \$5.00.

A convenient one-volume edition of the work, in which errors occurring in earlier editions have been corrected, and to which new physical and chemical data have been added.

THE PRINCIPLES, OPERATION, AND PRODUCTS OF THE BLAST FURNACE.

By J. E. Johnson, Jr. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 15 + 551 pp., 173 illus., 23 tab., 9 x 6 in., cloth. \$5.00.

A thorough, detailed discussion of the operation of the blast furnace, including both the theoretical principles and the practice of the present day. Completes the author's treatise on the manufacture of pig-iron, begun in his work entitled "Blast Furnace Construction".

FORGING:

Manual of Practical Instruction in Hand Forging of Wrought Iron, Machine Steel, and Tool Steel; Drop Forging; and Heat Treatment of Steel, Including Annealing, Hardening, and Tempering. By John Fernberg. Chic., American Technical Society, 1917. 131 pp., 206 illus., 2 pl., 3 tab., 8 x 6 in., cloth. \$1.00.

A concise account, intended primarily for students. Describes the methods and tools used in hand forging, as well as the usual shop practice in hardening, annealing, and tempering steel.

COLD DRAWN STEEL:

Bar Weights of Rounds, Flats, Hexagons, and Squares; Weight Tables for Plates; Metric Conversion Tables; Cold Drawn and Hot Rolled Extras, and Other Miscellaneous Tables (Cover title: Book of Weights). Issued by the Peerless Drawn Steel Co. Massillon, Ohio, The Peerless Drawn Steel Co., 1918. 145 pp., 52 tab., 8 x 5 in., flexible leather. \$3.00.

Instead of giving only the weight per foot of steel bars of various sizes, this book gives the totals for bars of all the usual lengths in feet. A number of other useful tables are added.

FIELD ARTILLERYMAN'S GUIDE:

3-Inch Gun, 4.7- and 6-Inch Howitzer. Prepared by the Officers of the 108th (2d Pa.) Field Artillery. 2d rev. ed. Phila., P. Blakiston's Son & Co. (copyright 1918). 381 pp., 102 illus., 3 pl., 31 tab., 7 x 4 in., cloth. \$1.75.

A pocket guide intended to serve the immediate needs of field artillerymen in the United States Army, by presenting the fundamentals of their duties.

SCIENTIFIC INDUSTRIAL EFFICIENCY:

By Dwight T. Farnham. Chic., Brick and Clay Record, 1917. 101 pp., 34 illus., 10 x 6 in., cloth. \$2.00.

In this book the author has endeavored to describe some applications of scientific management which have come under his observation during his experience as an engineer and executive. The examples given are chiefly taken from the clay products industry.

THE SCIENCE OF MANAGEMENT:

By Frederic A. Parkhurst. Cleveland, The Author (copyright 1918). 203 pp., 7 tab., 9 x 6 in., cloth. \$3.00.

A text-book prepared to accompany the author's course of thirty lectures, delivered during 1917-18 at the Case School of Applied Science.

CREATING CAPITAL:

Money-Making as an Aim in Business. By Frederick L. Lipman. Bost. and N. Y., Houghton Mifflin Co., 1918. 71 pp., 7 x 5 in., cloth. 75 cents.

HIGHER EDUCATION AND BUSINESS STANDARDS:

By Willard Eugene Hotchkiss. Bost. and N. Y., Houghton Mifflin Co., 1918. 109 pp., 7 x 5 in., cloth. \$1.00. (Gift of the University of California Press.)

Two essays delivered at the University of California on the Weinstock Foundation, established for the discussion of various phases of the moral law in its bearing on business life under the new economic order.

WAR-TIME CONTROL OF INDUSTRY:

The Experience of England. By Howard L. Gray. N. Y., The Macmillan Company, 1918. 15 + 307 pp., 8 x 5 in., cloth. \$1.75.

A summary of the development and status of governmental control of industry in Great Britain, arranged to show its successive stages. Part of the information was collected for the Commercial Economy Division of the Council of National Defense. The book concludes with a comparison of English and American experience.

COMPLETE LIST OF BASE PRICES, DIFFERENTIALS AND EXTRAS ON IRON,

Steel, and Non-Ferrous Products: Fixed under Government Supervision. Cleveland, Penton Publishing Co. (copyright 1918). 42 pp., 8 x 6 in., paper. \$2.00.

A convenient summary of the Government prices. Prepared by the *Iron Trade Review* and presented to subscribers to that journal.

COAL GAS RESIDUALS.

By Frederick H. Wagner. 2d ed., rev. and enl. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 13 + 244 pp., 45 illus., 12 pl. (10 folded), 7 diagrams, 32 tab., 9 x 6 in., cloth. \$2.50.

The chief additions to this edition discuss the process of tar distillation and tar products, and give further information on the product derived from spent oxide, the production of nitric acid, naphthalene, benzol, and toluol. A chapter on the manufacture of sulfuric acid from spent oxide has also been added, and the typographical errors in the first edition have been corrected.

ARTIFICIAL DYE-STUFFS:

Their Nature, Manufacture, and Uses. By Albert R. J. Ramsey and H. Claude Weston. Lond., George Routledge & Sons, Ltd.; N. Y., E. P. Dutton & Co., 1917. 212 pp., 24 illus., 9 x 6 in., cloth. \$1.60. (Donated by E. P. Dutton & Co.)

A brief introductory work on the artificial dye-stuff industry, written for students and business men with little knowledge of organic chemistry, in which the industrial processes of the manufacture of dye-stuffs, and the nature of the substances used, are explained at some length.

ELECTRO-DYNAMIC WAVE-THEORY OF PHYSICAL FORCES:

Announcing the Discovery of the Physical Cause of Magnetism, of Electro-dynamic Action, and of Universal Gravitation. Vol. 1, Bulletins 1 to 6, inclusive. By T. J. J. See. Lynn, Mass., Thomas P. Nichols & Son Co.; Lond., William Wesley & Son; Paris, A. Hermann et Fils, 1917. 14 + 158 pp., 21 diagrams, 4 pl., 1 chart, 6 tab. (1 folded), 12 x 10 in., paper. \$5.00.

In these bulletins Dr. See presents his hypothesis that magnetism, electro-dynamic action, and universal gravitation are due to waves propagated with the velocity of light through the free ether and at slower rates through solid masses. The author believes that his investigations have finally solved the problem of the nature and mode of propagation of physical forces.

WAR ADMINISTRATION OF THE RAILWAYS

In the United States and Great Britain. By Frank Haigh Dixon and Julius H. Parmelee. (Carnegie Endowment for International Peace, Division of Economics and History. Preliminary Economic Studies of the War.) N. Y., Oxford University Press, 1918. 13 + 155 pp., 10 x 7 in., paper. \$1.00. (Donated by the Carnegie Endowment for International Peace.)

An account of the methods used in the two countries and of the results achieved prior to December, 1917, during the period when the American railways were voluntarily co-operating with each other. The authors present a simple narrative, without attempting to draw conclusions.

STATE SANITATION:

A Review of the Work of the Massachusetts State Board of Health; Vol. 2. By George Chandler Whipple. Cambridge, Harvard University Press; Lond., Humphrey Milford, 1918. 452 pp., 17 illus., 3 pl., 1 por., 60 tab., 10 x 7 in., cloth. \$2.50.

This volume contains abstracts of the leading articles on subjects relating to preventive medicine, hygiene, and sanitation which are scattered through the annual and special reports of the Massachusetts State Board of Health published between 1869 and 1914. In addition, thirty-four of the most important contributions to sanitation are reprinted, with some abridgement.

THE PRINCIPLES OF SANITARY TACTICS:

A Handbook on the Use of Medical Department Detachments and Organizations in Campaign. By Edward Lyman Munson. Menasha, Wis., George Banta Publishing Co. (copyright 1917). 305 pp., 13 maps (2 folded maps in covers), 8 x 5 in., cloth. \$2.15.

The author's desire has been to provide a text-book which will standardize the methods of instructing line and medical officers in the tactical use of sanitary service with troops in campaign and will also give a thorough grounding in the fundamentals of sanitary tactics as a whole.

THE MODERN MILK PROBLEM:

In Sanitation, Economics, and Agriculture. By J. Scott MacNutt. N. Y., The Macmillan Company, 1917. 11 + 258 pp., 22 illus., 16 pl., 9 x 6 in., cloth. \$2.00.

Written to supply a convenient survey of the main aspects of the milk problem, which will emphasize the practical and economic as well as the sanitary factors involved. Intended for health officials, dairymen, legislators, and others interested in better milk supplies.

AGRICULTURAL BACTERIOLOGY:

A Study of the Relation of Germ Life to the Farm with Laboratory Experiments for Students. Micro-organisms of Soil, Fertilizers, Sewage, Water, Dairy Products, Miscellaneous Farm Products, and of Diseases of Animals and Plants. By H. W. Conn. 3d ed., rev. by Harold Joel Conn. Phila., P. Blakiston's Son & Co. (copyright 1918). 10 + 357 pp., 63 illus., 8 x 6 in., cloth. \$2.00.

The third edition has been brought up to date by the inclusion of the advances in bacteriological knowledge since the previous edition.

HANDBOOK OF HYDRAULICS:

For the Solution of Hydraulic Problems. By Horace Williams King. N. Y., McGraw-Hill Book Company, Inc.; Lond., Hill Publishing Company, Ltd., 1918. 16 + 424 pp., 91 illus., 112 tab., 2 diagrams, 7 x 4 in., flexible cloth. \$3.00.

The author has attempted to simplify the work of the hydraulic engineer by studying critically the empirical formulas which have been devised and selecting those which are of value. These are presented with a description of their limitations and are accompanied by the necessary tables of coefficients. The twofold purpose of securing an accuracy consistent with the best experiments and of simplifying calculations has been kept in mind throughout the book.

ROLL OF HONOR

A List of Members of the Society Who are Serving in the Army or Navy of the United States or Any of Its Allies.*

- Abbot, Frederic V.** Brig.-Gen., Corps of Engrs., N. A., Office, Chief of Engrs., U. S. A., Washington, D. C.
- Abbot, Frederick William.** Lt.-Col., British Army; Metropolitan Club, New York City.
- Acher, A. H.** Maj., Corps of Engrs., U. S. A., 4th Engrs., Camp Greene, N. C.
- Ackerman, Alexander S.** 1st Lieut., Engrs., U. S. R.; 11 Francis St., Newport, R. I.
- Ackerman, Arthur P.** 1st Lieut., U. S. R., 33d Engrs.; Great Barrington, Mass.
- Adams, Arthur.** Maj., Ord., U. S. R.; Inspection Mgr., Albemarle Bldg., New York City.
- Adams, Edward M.** Maj., U. S. A., Care, The Adjt.-Gen., U. S. A., Washington, D. C.
- Adams, Milton Jewell.** Capt., U. S. R., Co. C, 114th Engrs., Camp Beauregard, Alexandria, La.
- Adams, Raymond E.** Capt., Q. M. C., U. S. R.; Asst. to the Q. M., S. E. D., Peoples Bldg., Charleston, S. C.
- † **Agnew, Augustus Waterous.** Capt., 3d Canadian Pioneers.
- Albert, Frederick W.** Maj., U. S. R., 33d Engrs.; 23 Isham St., Burlington, Vt.
- Alden, Herbert C.** 1st Lieut., C. A. C., N. G. U. S., Fort Schuyler, N. Y.
- Alden, Langford Taylor.** Elève Aspirant, 32^{me} Artillerie (French Army); Care Morgan, Harjes Cie., Boulevard Hausseman, Paris, France.
- Alexander, E. Porter.** 1st Lieut., U. S. R., 509th Engrs., Fort Sam Houston, San Antonio, Tex.
- Alexander, Kay.** Maj., 2d in Command, 12th Canadian Ry. Troops, B. E. F., France.
- Allen, Franklin R.** Capt., Engrs., U. S. R., 8th Co., E. R. O. T. C., Camp Lee, Va.
- Allen, Herschel Heathcote.** Capt., Engrs., U. S. R.; Instr., Camp Lee, Petersburg, Va.
- Allen, Ralph B.** 1st Lieut., U. S. R., Co. B, 25th Engrs., Am. Exp. Force, France.
- Allen, Walter Henry.** Maj., Engrs., U. S. R.; 1112 East Jefferson St., Bloomington, Ill.
- Allen, Walter Hinds.** Civ. Engr., U. S. N. (rank of Lt.-Commander); Public Works Officer, Naval Training Station, Great Lakes, Ill.

* This list is made up from replies to a circular forwarded to members of the Society, and others, and is probably neither accurate nor complete. It is requested that the attention of the Secretary be called to any omissions or inaccuracies in order that they may be corrected in subsequent lists.

† Died in France.

- Allison, William F. Maj., Engrs., U. S. R., Am. Exp. Force, France.
- Altman, Frank S. Lieut., U. S. R., 23d Engrs.; Atchison, Kans.
- Altstaetter, F. W. Col., Corps of Engrs., U. S. A., U. S. Engr. Office, Grand Rapids, Mich.
- Anderson, J. E. Maj., 212th Field Co., Royal Engrs., B. E. F., France.
- Anderson, J. H. Capt., U. S. R.; Adj., 1st Replacement Engrs., Washington Barracks, Washington, D. C.
- Anderson, W. P. Capt., Engrs., U. S. R., Am. Exp. Force, France.
- Andrew, Clarence R. Capt., U. S. R., 32d Engrs., Camp Grant, Rockford, Ill.
- Andrews, Carl B. Capt., Engrs., U. S. R. (*Unassigned*); 743 Wyllie St., Honolulu, Hawaii.
- Andrews, J. H. M. Maj., Ord., U. S. R.; Commanding Officer, Raritan River Ordnance Depot, Metuchen, N. J.
- Angas, Robert M. 1st Lieut., U. S. N. G., 106th Engrs., Camp Wheeler, Macon, Ga.
- Annear, E. H. Capt., U. S. R., 20th Engrs., Camp American University, Washington, D. C.
- Applegarth, Gault. Capt., U. S. R., 23d Engrs., Care, War Dept., Washington, D. C.
- Ardery, Edward Dahl. Lt.-Col., Corps of Engrs., U. S. A., Am. Exp. Force, France.
- Armitage, George W. Capt., Q. M. C., U. S. R., Care Q. M., Port of Embarkation, Hoboken, N. J.
- Arms, Leo M. Lieut., U. S. R., Co. F, 2d Engrs., Am. Exp. Forces, France.
- Armstrong, Charles Johnstone. Brig.-Gen.; Chf. Engr., H. Q., Canadian Army Corps, B. E. F., France.
- Armstrong, Merwin. Capt., U. S. R., 105th Engrs., 30th Div., Camp Sevier, Greenville, S. C.
- Arn, William G. Capt., U. S. R., 1st Bn., 13th U. S. Engrs. (Ry.), Am. Exp. Force, France.
- Ashkins, Nathan Thomas. 1st Lieut., Engrs., U. S. R., Lines of Communication, Eng. Headquarters, Am. Exp. Force, France.
- Ashley, Carl. Capt., Engrs., U. S. R., U. S. Military P. O. 702, Am. Exp. Force, France.
- Ashmead, P. H. Maj., Engrs., U. S. R.; 35 Nassau St., New York City.
- Ashton, Raymond. U. S. Army School of Military Aeronautics, Cambridge, Mass.
- Asplundh, E. T. Capt., U. S. R.; Supply Officer, 103d Engrs., 28th Div., U. S. N. G., Camp Hancock, Augusta, Ga.
- Asserson, Henry Raymond. Maj., Engrs., U. S. R., C. E. L. O. C., Am. Exp. Force, France.
- Atterbury, W. W. Brig.-Gen.; Director of Transportation, Am. Exp. Force, France.

- Atwood, William G.** Maj., U. S. R., 17th Engrs. (Ry.), Am. Exp. Force, France, Care, Adj. Gen., Washington, D. C.
- Austill, Huriesco.** Capt., U. S. R., Co. D, 501st Engr. Service Bn., Am. Exp. Force, France.
- Ayres, John Henry.** Capt., U. S. R., Co. D, 42d Engrs., Camp American University, Washington, D. C.
- Ayres, Quincy C.** 2d Lieut., Engrs., U. S. R., Am. Exp. Force, France.
- Babbitt, Harold E.** Capt., Engrs., U. S. R., Chf. Engr.'s Office, Adv. Sect. S. O. R., U. S. P. O. No. 714, Am. Exp. Force, France.
- Baffrey, Charles R.** Capt., 102d Reg. d'Artillerie (French Army), Secteur Postal 160, B. C. M., Paris, France.
- Bailey, Lewis P.** Capt., U. S. R., Co. A, 304th Engrs., Camp Meade, Baltimore, Md.
- Bakenhus, R. E.** Civ. Engr., U. S. N. (rank of Commander), Bureau of Yards and Docks, Washington, D. C.
- Baker, H. S.** Lt.-Col., N. A., 111th Engrs., Camp Bowie, Fort Worth, Tex.
- Baker, Shirley.** Capt., U. S. R., Co. B, 23d Engrs., Camp Meade, Md.
- Balch, William H.** Capt., Engrs., U. S. R., A. P. O. 712, Am. Exp. Force, France.
- Bandy, Edward L.** 1st Lieut., Engrs., U. S. R., Camp American University, Washington, D. C.
- Barber, Charles W.** Private, 38th Engrs.; 3428 Brown St., N. W., Washington, D. C.
- Barber, Justin F.** Sergeant, Co. M, 23d Engrs., Am. Exp. Forces, France.
- Barber, Norman N.** Capt., N. A., 16th Engrs., Am. Exp. Force, France.
- Barclay, A. J.** 1st Lieut., Engrs., U. S. R., Fort Leavenworth, Kans.
- Barney, Samuel E.** Maj., Engrs., U. S. R. (*Unassigned*); 346 Whitney Ave., New Haven, Conn.
- Bartholomew, B. W.** Lieut., U. S. R., 301st Engrs., Camp Devens, Ayer, Mass.
- Bascom, George R.** Maj., San. Corps, U. S. A., Fort Oglethorpe, Ga.
- Bassett, Herbert H.** Maj., Engrs., U. S. R., Constr. Branch, Constr. Div.; Res., 5 Iowa St., Worcester, Mass.
- Battie, H. S.** 1st Lieut., U. S. R., 23d Engrs., Camp Meade, Md.
- Baxter, O. G.** Capt., U. S. R., Co. C, 601st Engrs., Camp Glen Burnie, Md.
- Bayliss, Paul.** 2d Lieut., U. S. R., 8th Engrs. (Mounted), Camp Baker, Fort Bliss, Tex.
- Beach, Lansing H.** Col., Corps of Engrs., U. S. A., 412 Custom House, Cincinnati, Ohio.
- Beall, Pendleton.** Private, Headquarters Co., 165th Inf., Am. Exp. Force, France.

- Beam, Carl Eugene.** Co. E, 316th Engrs., Camp Lewis, American Lake, Wash.
- Bebb, Edward C.** Capt., Engrs., U. S. R., U. S. Geological Survey, Washington, D. C.
- Beeman, Thomas R.** Capt., Engrs., U. S. R., Am. Exp. Force, France.
- Beerbower, Dumont.** 1st Lieut., Engrs., U. S. R.; Asst. Instr., Co. 1, E. R. O. T. C., Camp Lee, Petersburg, Va.
- Begg, R. B. H.** Capt., Engrs., U. S. R., Am. Exp. Force, France.
- Behrman, I. E.** 1st Lieut., Engrs., U. S. R., Care, C. E. O., Zone of the Advance, Am. Exp. Force, France.
- Belknap, Francis W.** Engrs., U. S. R., U. S. Army P. O. 705, Am. Exp. Force, France.
- Bell, George Edward.** Lieut., Canadian Engrs., Care, Bank of Montreal, Waterloo Pl., London, S. W., England.
- Bellinger, L. F.** Civ. Engr., U. S. N. (rank of Commander), U. S. Navy Yard, Bremerton, Wash.
- Belzner, Theodore.** 1st Lieut., Engrs., U. S. R. (*Unassigned*); 574 West 176th St., New York City.
- Benham, Claude Gilbert.** Capt., C. A. C., U. S. A., 800 Park Ave., Norfolk, Va.
- Benham, W. L.** Maj., Q. M. C., U. S. R.; Engr. Officer in Chg. of Camp Utilities, Camp Funston, Fort Riley, Kans.
- Bennison, Ernest William.** 1st Lieut., U. S. R., 23d Engrs., Camp Meade, Md.
- Bensel, J. A.** Maj., Engrs., U. S. R., Engr. Depot, Norfolk, Va.
- Benson, Orville.** Maj., Engrs., U. S. R., Headquarters, Am. Exp. Force, France.
- Berdeau, Ray W.** Capt., Engrs., U. S. R.; Asst. Div. Engr., 82d Div. Artillery, Am. Exp. Force, France.
- Betts, Clifford A.** 1st Lieut., C. A. C., U. S. R., Battery E, 52d Artillery, Am. Exp. Force, France.
- Biddle, John.** Maj.-Gen., Corps of Engrs., U. S. A.; Asst. Chf. of Staff, U. S. A., War Dept., Washington, D. C.
- Billings, A. W. K.** Lt.-Commander, Care, Commander, U. S. Naval Aviation Forces, Paris, France.
- Billings, Fred M.** Capt., Engrs., U. S. R., Camp Lee, Petersburg, Va.
- Binckley, George Sydney.** Maj., U. S. R., 112th Engrs., Montgomery, Ala.
- Binger, Walter D.** 2d Lieut., Sig. R. C.; 280 Madison Ave., New York City.
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- Bishop, Roy P.** 2d Lieut., U. S. R., 35th Engrs., Camp Grant, Rockford, Ill.
- Bither, T. A.** Lieut., Sig. R. C., A. S., Aviation School, Rockwell Field, San Diego, Cal.
- Bixby, William H.** Brig.-Gen., U. S. A. (*Retired*), 428 Customhouse, St. Louis, Mo.

- Black, Dudley F.** Capt., Engrs., U. S. R., 513th Service Bn., Camp Travis, Tex.
- Black, G. G.** Capt., Engrs., U. S. R.; Acting Adjt., 314th Engrs., Camp Funston, Fort Riley, Kans.
- Black, James B.** 1st Lieut., Engrs., U. S. R., Chf. Engr.'s Office, Headquarters, Am. Exp. Force, France.
- Black, Ralph P.** 1st Lieut., U. S. R., 32d Engrs., Camp Grant, Rockford, Ill.
- Black, Roger Derby.** Lt.-Col., Corps of Engrs., U. S. A., Headquarters, Am. Exp. Force, France.
- Black, William M.** Maj.-Gen., Chf. of Engrs., U. S. A., War Dept., Washington, D. C.
- Blackman, J. W. B.** Lieut., Canadian Ry. Troops, Canadian Expeditionary Force.
- Blair, Alexander.** 2d Lieut., Royal Engrs., B. E. F., France.
- Blair, McCreia Parker.** Capt., No. 1 Depot Bn., Manitoba Reg., Winnipeg, Man., Canada.
- Blanchard, Murray.** Maj., U. S. R., 520th Engrs., Camp Devens, Ayer, Mass.
- Boesch, Clarence E.** Capt., U. S. N. G., Co. B, 105th Engrs., Camp Sevier, Greenville, S. C.
- Boggs, F. C.** Col., 315th Engrs., N. A., Camp Travis, San Antonio, Tex.
- Boland, Charles J.** 1st Lieut., Sig. C., U. S. A., 80th Aero Squadron, Am. Exp. Force, France.
- Bolin, Harry W.** Sergeant, Co. E, 23d Engrs., Camp Meade, Annapolis Junction, Md.
- Bond, P. S.** Col., 107th Engrs., N. A.; Div. Engr., 32d Div., Army Engr. School, U. S. P. O. 714, Am. Exp. Force, France.
- Bonner, John P.** Capt., C. A. C., U. S. R., Am. Exp. Force, France.
- Boorman, Kitchell M.** Lieut., Sig. C., U. S. A., 481st Aero Squadron, Am. Exp. Force, France.
- Booth, Raymond.** 1st Lieut., U. S. R., 54th Engrs.; 30 Center St., City Island, N. Y.
- Booz, Horace Corey.** Col., R. T. C., N. A., Care, D. G. T., Am. Exp. Force, France.
- Bott, C. N.** 1st Lieut., U. S. R., 312th Engrs., Camp Pike, Little Rock, Ark.
- Bowen, Edward Withers.** Capt., Inf., U. S. R., Camp Lee, Petersburg, Va.
- Bowlby, Henry L.** Maj., 43d Engrs., N. A., Camp Headquarters, Camp American University, Washington, D. C.
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- Taylor, Nelson.** Lieut., U. S. N., U. S. S. *Bridgeport*, Care, Postmaster, New York City.
- Taylor, P. M.** 2d Lieut., R. E., 237th Field Co., B. E. F., Italy.
- Taylor, Seneca V.** Capt., C. A. C., U. S. R., Coast Defenses, Portland, Me.
- Taylor, William T.** Capt., Royal Flying Corps, B. E. F., France.
- Taylor, Wyllys H.** Capt., U. S. R., 306th Engrs., N. A. (81st Div.), Camp Jackson, Columbia, S. C.
- Ten Hagen, Henry.** 2d Lieut., Engrs., U. S. R., Am. Exp. Force, France.
- Tenney, Willis R.** Capt., Engrs., U. S. R., Eng. Depot, U. S. A. P. O. 712, Am. Exp. Force, France.
- Thomas, Charles D.** Capt., U. S. R., Co. B, 507th Engrs., Am. Exp. Force, France.
- Thomas, W. E.** Capt., San. Corps, N. A., Box 625, M. O. T. C., Fort Oglethorpe, Ga.
- Thompson, Sanford E.** Maj., Progress Section, Office of Chf. of Ordnance, Washington, D. C.
- Thomsen, S. L.** Capt., U. S. R., Co. A, 57th Engrs., Camp Laurel, Md.

- Thomson, F. M.** Capt., 39th Engrs., U. S. A., Am. Exp. Force, France.
- Throop, George H.** Capt., U. S. R., Co. E, 24th Engrs., Camp Dix, Wrightstown, N. J.
- Thurber, Clinton D.** Civ. Engr., U. S. N. (rank of Lt.-Commander), Bureau of Yards and Docks, Washington, D. C.
- Thurston, Eugene T.** Capt., U. S. R., 25th Engrs., Camp Devens, Ayer, Mass.
- Tilden, Charles Joseph.** Capt., Engrs., U. S. R. (*Unassigned*), Care, Johns Hopkins Univ., Baltimore, Md.
- Tinsley, R. B.** Capt., Engrs., U. S. R., E. R. O. T. C., Camp Lee, Va.
- Tirrell, Charles Edwards.** Sig. C., A. S. (Non-Flying), School of Military Aeronautics, Mass. Inst. Tech., Boston, Mass.
- Todd, Frank Herbert.** Maj., Q. M. C., U. S. R., in Chg. of Utilities, Camp Travis, San Antonio, Tex.
- Todd, Oliver J.** Capt., U. S. R.; Adj., 3d Bn., 20th Engrs., Am. Exp. Forces, France.
- Tolles, F. C.** 1st Lieut., U. S. R., 112th Engrs., Camp Sheridan, Montgomery, Ala.
- Tomlinson, Alfred Thomas.** Maj., Canadian Engrs.; Insp., Small Arms Ammunition, Dominion Arsenal, Lindsay, Ont., Canada.
- Tompkins, Robert Harry.** 1st Lieut., 111th Engrs., Camp Bowie, Tex.
- Topping, Perry.** Capt., U. S. R., 5th U. S. Engrs., Corpus Christi, Tex.
- Torrance, William M.** Capt., Engrs., U. S. R.; Asst. to Const. Q. M., Raritan River Ordnance Depot, Metuchen, N. J.
- Townsend, C. McD.** Col., Corps of Engrs., U. S. A., 12th Engrs. (Ry.), Am. Exp. Force, France.
- Tracy, C. C.** Capt., C. A. C., U. S. R., Fort Terry, N. Y.
- Tracy, Herbert Herman.** 1st Lieut., U. S. R., Wagon Co. 4, 23d Engrs., Am. Exp. Forces, France.
- Travers-Ewell, Andrew.** Care, American Consul, Para, Brazil.
- Trimpi, Allan Littell.** 1st Lieut., 104th Engrs., Camp McClellan, Anniston, Ala.
- Trout, Alexander Linn.** Capt., Engrs., U. S. R. (*Unassigned*), Am. Exp. Force, France.
- True, Albert O.** Capt., Engrs., U. S. R., Office, Chf. of Engrs., U. S. A., Washington, D. C.
- Trueblood, P. McG.** Lieut., U. S. N. R. F., Navy Yard, Boston, Mass.
- Tucker, H. F.** Ensign, U. S. N. R. F.; Seattle Construction & Dry Dock Co., Seattle, Wash.
- Turley, Jay.** Capt., Engrs., U. S. R., Special Staff Service (Abroad), Am. Exp. Force, France.
- Turner, Daniel Norman.** 2d Lieut., U. S. R., 304th Engrs., Camp Meade, Baltimore, Md.
- Turner, Nathaniel Parker.** Capt., U. S. N. G.; Topographical Officer, 111th Engrs., Camp Bowie, Fort Worth, Tex.

- Tuska, Gustave R.** Maj., Engrs., U. S. R.; 68 William St., New York City.
- Tyson, William C.** Capt., Engrs., U. S. R., Co. No. 2, Camp Custer Replacement Draft, Am. Exp. Force, France.
- Uhler, W. D.** Maj., Q. M. C., N. A.; Chf. Engr., Pennsylvania State Highway Dept., Harrisburg, Pa.
- Van Buren, Maurice Pelham.** 2d Lieut., Corps of Engrs., U. S. A., New Brighton, N. Y.
- Vandemoer, N. C.** Capt., Engrs., U. S. R., Camp Lee, Petersburg, Va.
- Vandervoort, B. F.** Capt., Engrs., U. S. R., 9th Co., E. R. O. T. C., Camp Lee, Petersburg, Va.
- Vandevanter, Elliott.** Capt., U. S. R., Co. D, 503d Engrs., Am. Exp. Force, France.
- Van Ness, R. A.** Lieut., Engrs., U. S. R.; McLean, Ill.
- Van Pelt, Sutton.** Capt., U. S. R., 27th Engrs., Camp Meade, Md.
- *Vansittart, George Edward.** Maj., 13th Battery, Canadian Field Artillery, 2d Canadian Div.
- Van Suetendael, Achille O.** Capt., Engrs., U. S. R., 1438 U St., N. W., Washington, D. C.
- Van Zile, Harry Lee.** Maj., Engrs., U. S. R., Am. Exp. Force, France.
- Vaughan, Henry F.** Capt., San. Corps, 1st, Camp Travis, San Antonio, Tex.
- Verrill, George E.** Maj., Engrs., U. S. R.; Dist. Engr., in Chg. of Impvts., Yellowstone Park, U. S. Engr. Office, Yellowstone Park, Wyo.
- Vincent, W. H.** 1st Lieut., Engrs., U. S. R., 9th Co., E. R. O. T. C., Camp Lee, Petersburg, Va.
- Vogleson, J. A.** Maj., San. Corps, N. A., Camp Johnston, Fla.
- Volk, Wendell Douglas.** 1st Lieut., U. S. R., Co. E, 20th Engrs., Am. Exp. Force, France.
- von Deesten, A. P.** Capt., Corps of Engrs., U. S. A., Co. F, 5th Engrs., Corpus Christi, Tex.
- Wade, George W.** 1st Lieut., Co. D, 2d Bn., 117th Engrs., 42d Div., Am. Exp. Force, France.
- Wadsworth, George R.** Maj., Signal Corps, U. S. A.; Chf. Engr., Naval Aircraft Factory, Navy Yard, Philadelphia, Pa.
- Wadsworth, Henry H.** Maj., Engrs., U. S. R. (*Unassigned*), 405 Custom House, San Francisco, Cal.
- Wagner, John, Jr.** 1st Lieut., Cavalry, U. S. R., First Corps School, Army P. O. No. 703, France.
- Waite, Clement F.** 2d Lieut., Engrs., U. S. R., Vancouver Barracks, Vancouver, Wash.
- Waite, H. M.** Lt.-Col., Sig. C., N. A., Am. Exp. Forces, France.
- Waldron, Albert E.** Col., 35th Engrs., U. S. A., Am. Exp. Force, France.

* Died in France.

- Walker, Edward G.** Lieut., Royal N. V. R., 78 Cheyne Court, Chelsea, London, S. W. 3, England.
- Walker, Elton D.** Capt., U. S. R., Co. A, 5th U. S. Engrs., Am. Exp. Force, France.
- Walker, Harry Bruce.** Capt., Engrs., U. S. R.; Asst. to Div. Engr., 78th Div., N. A., Camp Dix, Wrightstown, N. J.
- Walker, Meriwether Lewis.** Col., Engrs., N. A., G. H. Q., Am. Exp. Force, France.
- Walker, W. Kemp.** Capt., Engrs., U. S. R.; Office Director Gen. of Military Rys., 2200 Insurance Exchange, Chicago, Ill.
- Wallace, David A.** 1st Lieut., Engrs., U. S. R., Am. Exp. Force, France.
- Wallace, Harold U.** Maj., Engrs., N. A.
- Waller, Percy.** Capt., Engrs., U. S. R., Camp Lee, Petersburg, Va.
- Walton, H. B.** Capt., U. S. R., 312th Engrs., Camp Pike, Little Rock, Ark.
- Ward, George S.** 2d Lieut., U. S. R., Co. A, 117th Engrs., Am. Exp. Force, France.
- Ward, Jasper D.** Corporal, Co. C, 55th Inf., Chickamauga Park, Chattanooga, Tenn.
- Ward, Lyman Wise.** Capt., C. A. C., U. S. R., Battery E, 63d Artillery, Fort Flagler, Wash.
- Ware, Howard T.** 2d Lieut., Q. M. C., N. A., Bakery Co. No. 317, Camp Doniphan, Okla.
- Ware, John.** 1st Lieut., Co. A, 101st Engrs., Am. Exp. Force, France.
- Ware, Norton.** Capt., Engrs., U. S. R., Am. Exp. Force, France.
- Warfield, Ralph M.** Civ. Engr., U. S. N. (rank of Lt.-Commander), Navy Aeronautic Station, Pensacola, Fla.
- Waring, C. T.** Maj., Sig. R. C., Fort Wayne, Mich.
- Warner, Elwin S.** Capt., U. S. R., Co. B, 301st Engrs., Camp Devens, Ayer, Mass.
- Warnock, W. H.** Capt., Q. M. C., N. A., Care, Const. Q. M., Camp Stuart, Va.
- Warren, Horace P.** Maj., 55th Engrs., N. A., Camp Custer, Battle Creek, Mich.
- Warren, James G.** Col., Corps of Engrs., U. S. A., 540 Federal Bldg., Buffalo, N. Y.
- Warren, Minton M.** 1st Lieut., U. S. R., Headquarters Co., 101st Engrs., 51st Brigade, 26th Div., Am. Exp. Force, France.
- Warren, Philip R.** Maj., Royal Engrs., P. C. E., A. P. O. S. 10, B. E. F., France.
- Watkins, Guy A.** Capt., Engrs., U. S. R., Fort Sill, Okla.
- Watson, D. M.** Lieut., M. T., A. S. C., 100th Siege Battery, R. G. A., B. E. F., France.
- Watson, George L.** Capt., U. S. R., Co. B, 30th U. S. Engrs., Am. Exp. Force, France.

- Watson, Winslow B.** Lieut., Co. C, 7th N. Y. Inf. (114th), Camp Wadsworth, Spartanburg, S. C.
- Waugh, William H.** Capt., Engrs. U. S. R.; Pres. and Engr. Officer, Alaska Road Comm. and Senior Highway Engr., Office of Public Roads and Rural Eng., Juneau, Alaska.
- Way, W. F.** Sergeant, Co. D, 18th Engrs. (Ry.), U. S. Army Post Office No. 705, Am. Exp. Force, France.
- Weaver, C. J.** 1st Lieut., Engrs., U. S. R., Am. Exp. Force, England.
- Weaver, Earl Chase.** Asst. Civ. Engr., U. S. N. R. F., Navy Yard, Puget Sound, Wash.
- Weaver, Frank L.** 1st Lieut., 305th Engrs., Camp Lee, Petersburg, Va.
- Webb, Claude A.** Lieut., F. A., U. S. R., Am. Exp. Force, France.
- Webb, De Witt Clinton.** Civ. Engr., U. S. N. (rank of Lt.-Commander), Navy Yard, Philadelphia, Pa.
- Webb, George H.** Lt.-Col., 16th U. S. Engrs. (Ry.), Am. Exp. Force, France.
- Webb, I. Gano.** Capt., Engrs., U. S. R., Camp Lee, Petersburg, Va.
- Webb, Walter Loring.** Maj., Engrs., U. S. R., Am. Exp. Force, France.
- Webster, Maurice A.** Capt., Ord. Dept., N. A., Sandy Hook Proving Ground, Fort Hancock, N. J.
- Weeks, W. C.** Maj., N. A., 32d Engrs., Camp Grant, Rockford, Ill.
- Welles, Theodore L., Jr.** 2d Lieut., U. S. R., 318th Engrs., Vancouver Barracks, Wash.
- Wenige, Arthur E.** Maj., U. S. R., 317th Engrs., Camp Sherman, Chillicothe, Ohio.
- Wenzell, Andrew P.** Capt., Co. F, 16th U. S. Engrs. (Ry.), Am. Exp. Force, France.
- West, Edward Hazzard.** Capt., U. S. R., Co. F, 5th Engrs., Corpus Christi, Tex.
- Wheat, G. Neville.** Capt., Engrs., U. S. R., Am. Exp. Force, France.
- Wheeler, Frank I.** 2d Lieut., Sig. R. C., A. S., Equipment Div., Inspection Dept., Sig. C., 119 D St., N. E., Washington, D. C.
- Wheelock, De Forest A.** Col., U. S. A.; Civ. and San. Engr., Warren, Pa.
- Whiteaker, Robert O.** Capt., 132d Field Artillery, Camp Bowie, Tex.
- Whitman, Ezra B.** Maj., Q. M. C., U. S. R.; Chf. Engr. of Utilities, Camp Meade, Admiral, Md.
- Whitman, Ralph.** Civ. Engr., U. S. N. (rank of Lt.-Commander); Aide on Staff of U. S. Military Governor of Santo Domingo, Santo Domingo, Dominican Republic.
- Whitney, John T.** 2d Lieut., F. A., U. S. R., Field Artillery Replacement Depot, Camp Jackson, Columbia, S. C.
- Whitney, Ralph Edward.** 1st Lieut., San. Corps, N. A., San Insp.'s Office, Camp Lewis, American Lake, Wash.

- Whitwell, E.** Capt., General Service Staff, British War Office, Robert Treat Hotel, Newark, N. J.
- Wickersham, John H.** Capt., Engrs., U. S. R., P. O. 706, Am. Exp. Force, France.
- Widdicombe, R. A.** Maj., Engrs. U. S. R.; Const. Q. M., Chemical Plant No. 4, Saltville, Va.
- Wiggin, Thomas H.** Capt., Engrs., U. S. R., Care, Gen. Taylor, Am. Exp. Force, France.
- Wiggins, Ralph Raymond.** 1st Lieut., Sig. R. C., A. S., Aviation Concentration Camp and Supply Depot, Garden City, N. Y.
- Wild, H. J.** Capt., U. S. R., 3d Engrs., Corozal, Canal Zone, Panama.
- Wildish, Frederic Newton.** Capt., U. S. R., Co. B, 309th Engrs., N. A., Camp Zachary Taylor, Ky.
- Wilgus, W. J.** Col., Engrs., N. A., Am. Exp. Force, France.
- Willard, George T.** Private, Co. E, 318th Engrs., Vancouver Barracks, Wash.
- Willard, N. R.** Capt., Engrs., U. S. R., 510th Service Bn., Camp Lee, Petersburg, Va.
- Williams, Alan F.** Master Engr. (Junior Grade), Headquarters Co., 18th Engrs. (Ry.), U. S. Army P. O. No. 705, Am. Exp. Force, France.
- Williams, Samuel W.** Maj., Engrs., U. S. R.; Asst. Engr., 90th Div., Camp Travis, Tex.
- Williamson, Harry.** Lieut., Royal Engrs., British Army; 11 Cornwall Ave., Church End, Finchley, London, N. 3, England.
- Williar, Harry D., Jr.** 1st Lieut., 1st U. S. Engrs., Am. Exp. Force, France.
- Willis, Walter John.** Lieut. (EDO), Bldg. 22, Navy Yard, Brooklyn, N. Y.
- Wilson, Everitt W.** Capt., Engrs., U. S. R., 510th Service Bn., Camp Lee, Petersburg, Va.
- Wilson, Harry P.** Capt., U. S. R., 310th Engrs., Camp Custer, Mich.
- Wilson, Robert B. M.** Capt., U. S. R., 311th Engrs., Camp Grant, Rockford, Ill.
- Wilson, William R.** Maj., 23d Field Co., R. E., B. E. F., France.
- Wing, Charles B.** Maj., 23d Engrs., Camp Meade, Admiral, Md.
- Winn, Walter E.** Lt.-Col., U. S. R., 114th Engrs., 39th Div., Camp Beauregard, Alexandria, La.
- Winn, Walter S.** Maj., Engrs., U. S. R., 4th and 1st National Bank Bldg., Nashville, Tenn.
- Winton, Walter Ferrell.** Capt., 14th U. S. Field Artillery, Fort Sill, Okla.
- Wood, B. Russell.** Capt., Engrs., U. S. R. (*Unassigned*), U. S. M. P. O. 733, Am. Exp. Forces, France.
- Wood, Frederic J.** Maj., Engrs., U. S. R., Curtis Bay Ordnance Depot, South Baltimore, Md.

- Woodard, Wilkie.** Capt., U. S. R., Co. H, 35th Engrs., A. P. O. 735, Am. Exp. Forces, France.
- Woodle, Bernon Tisdale.** Capt., Engrs., U. S. R., Care, Depot Engr., Coca Cola Bldg., Baltimore, Md.
- Woodruff, Glenn B.** 1st Lieut., Engrs., U. S. R., Engr. Training Camp, American University, Washington, D. C.
- Woolworth, W. H.** Capt., U. S. A., Headquarters, 2d Brigade, 1st Div., Am. Exp. Force, France.
- Wooten, William P.** Maj., Corps of Engrs., U. S. A., Brownsville, Tex.
- Wright, John Bertram.** Capt., U. S. R., 9th Co. Engrs., Camp Lee, Petersburg, Va.
- Wrightson, William D.** Maj.; Chf. of San. Corps, Surgeon-General's Office, War Dept., Washington, D. C.
- Yereance, Alex. W.** 1st Lieut., Co. F, 305th Pioneer Engrs., Camp Lee, Petersburg, Va.
- Yost, Howard McC.** Capt., Engrs. U. S. R., 2030 F St., N. W., Washington, D. C.
- Young, Frederick C.** Capt., U. S. R.; Adjt., 114th Engrs., Camp Beauregard, La.
- Young, George S.** Capt., Engrs., U. S. R., Camp Lee, Petersburg, Va.
- Young, Samuel M.** Capt., Engrs., U. S. R.; Engr., New Orleans Assoc. of Commerce, 635 Common St., New Orleans, La.
- Zinn, George A.** Col., Corps of Engrs., U. S. A., 321 Custom House, Portland, Ore.

MEMBERSHIP

(From April 5th to May 2d, 1918)

ADDITIONS

MEMBERS		Date of Membership.
BURCH, GEORGE FRANCIS. Acting Bridge Engr., Div. of Highways, Dept. of Public Works and Bldgs., Spring- field, Ill.....		Mar. 12, 1918
BYRNE, EDWARD ABRAHAM. 34 Plaza St., Brooklyn, N. Y....		April 16, 1918
CASTLE, SAMUEL NORTHRUP. Commercial Engr., Gen. Elec. Co., 120 Broadway, New York City.....		April 16, 1918
CLARK, CHARLES HOMER. Pres., Clark Car Co., 1639 Oliver Bldg., Pittsburgh, Pa.....		April 16, 1918
DAVIS, JAMES LYFORD. Dist. Highway Commr., State Highway Dept.; Engr., Bennington County Impvt. Assoc., Manchester Cen- ter, Vt.....	Assoc. M. M.	May 4, 1904 Mar. 12, 1918
GREELEY, SAMUEL ARNOLD. Hydr. and San. Engr., 64 West Randolph St., Chicago, Ill.....	Jun. Assoc. M. M.	Feb. 5, 1907 Mar. 4, 1913 April 17, 1918
HABERMAYER, GEORGE CONRAD. Engr., Illinois State Water Survey, 1103 Euclid St., Champaign, Ill.....		April 16, 1918
HALL, WILLIAM HENRY. City Engr. and Director of Public Works, 2 Sherman Court, New Britain, Conn.....	Assoc. M. M.	Oct. 4, 1910 Nov. 27, 1917
HUMPHREY, GILBERT EDWIN. Maj., Corps of Engrs., U. S. A.; Officer in Chg. of Engr. Depot, 1111 Calley Ave., Norfolk, Va.....		Mar. 12, 1918
JONES, LEE MORGAN. City Engr., Port Arthur, Ont., Canada.....	Assoc. M. M.	July 2, 1913 Mar. 12, 1918
MACDONALD, CHARLES. County Supt. of High- ways, Westchester County, Court House, White Plains, N. Y.....	Jun. Assoc. M. M.	April 30, 1912 Oct. 1, 1913 April 17, 1918
MONTERO, JULIO DANIEL. Chf. Engr., Bureau of Roads and Bridges, P. O. Box 837, Havana, Cuba.....	Jun. Assoc. M. M.	Oct. 1, 1907 Feb. 28, 1911 Mar. 12, 1918
REIMANN, ROBERT. Asst. Engr. in Chg. of Surveys, B. & O. R. R., Relay, Md.....	Jun. Assoc. M. M.	Oct. 3, 1905 Feb. 4, 1913 April 17, 1918
SCHUSLER, GEORGE WILLIAM. Div. Engr., Dept. of Public Works, 6201 Stanton Ave., Pittsburgh, Pa.....		April 16, 1918
STEINMAN, DAVID BARNARD. Associate Engr., Waddell & Son, 35 Nassau St., New York City.....	Jun. Assoc. M. M.	Mar. 1, 1910 April 7, 1915 April 17, 1918

MEMBERS (Continued)

Date of
Membership.

STEVENSON, WILLIAM LAWRIE. San. Engr., Dept. of Health and Sanitation, Emer- gency Fleet Corporation, U. S. Shipping Board, 3711 McKinley St., Chevy Chase, Md.	} Assoc. M. M.	Oct. 2, 1907
		April 17, 1918
VARNY, WILLIAM WESLEY. Acting Harbor Engr., Balti- more City, 710 North Carey St., Baltimore, Md.		April 16, 1918
WAIT, BERTRAND HINMAN. Dist. Engr., Port- land Cement Assoc., 101 Park Ave., New York City	} Assoc. M. M.	Jan. 2, 1912
		April 17, 1918
WEED, IRVING. 82 Lafayette Ave., Brooklyn, N. Y.		Mar. 12, 1918
WHITE, BARCLAY. Pres., Barclay White & Co., 1713 Sansom St., Philadelphia, Pa.	} Assoc. M. M.	Aug. 31, 1915
		April 17, 1918
WOODLE, ALLAN SHELDON, JR. Engr. in Chg. of Constr., Baldwin Locomotive Works, Eddystone, Pa.	} Assoc. M. M.	July 9, 1906
		Mar. 12, 1918
WOODWARD, SHERMAN MELVILLE. Prof. of Mechanics and Hydraulics, State Univ. of Iowa, Iowa City, Iowa...		April 16, 1918

ASSOCIATE MEMBERS

ALGER, RALPH TISDALE. Vice-Pres. and Treas., The Alger & Kraus Co. (Res., 1157 East 145th St.), Cleveland Ohio	} Jun. Assoc. M.	June 24, 1914
		April 16, 1918
BAINBRIDGE, CHARLES NEWTON. With C. & St. P. Ry., Lombard, Ill.		Oct. 9, 1917
BAYLY, HOWARD PAUL. Prin. Asst. Engr., Saville & Clai- borne, Inc.; Address, 102 South Boulevard, Rich- mond, Va.		April 16, 1918
BEAM, CARL EUGENE. Co. E, 316th Engrs., Camp Lewis, American Lake, Wash.		Mar. 12, 1918
BLOEMKER, HAROLD WILLIAM. Engr. with J. S. Cornell & Sons, 1441 West Venango St., Philadelphia, Pa.	} Jun. Assoc. M.	Oct. 31, 1911
		April 16, 1918
BRES, EDWARD SEDLEY. 1st Lieut., U. S. R., 114th Engrs., Camp Beauregard, La.		Nov. 27, 1917
BRITTON, LLOYD C. Gen. Mgr., Alabama Central R. R., Jasper, Ala.		Mar. 12, 1918
CAUGHEY, ROBERT ANDREW. Asst. Prof. of Civ. Eng., Penn- sylvania State Coll., 431 West Fairmount Ave., State College, Pa.		April 16, 1918
CHADWICK, HAZLETON MIRKIL. Asst. Chf. Engr., The Valier- Montana Land & Water Co., Valier, Mont.		April 16, 1918
CONNOR, EDWARD COWEN. Engr., Vibrolithic Contr. Co., Inc., 4521 Highland Drive, Dallas, Tex.		Mar. 12, 1918

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
CRAVEN, AARON SANFORD. Chf. Engr., Edwin H. Vare, 505 Independence Ave., Oak Lane, Philadelphia, Pa.		Mar. 12, 1918
DAVIS, CHARLES ELDRIDGE. Chf. Draftsman, City of Spokane, City Engr.'s Office, Spokane, Wash.		April 16, 1918
EDEN, ALFRED WILLIAM ALEXANDER. Asst. Structural Engr., Westinghouse, Church, Kerr & Co., 37 Wall St., Room 900, New York City.		Mar. 12, 1918
ELIOT, WILLIAM MACK. Office Engr., Houston Structural Steel Co., 1220 Harvard St., Houston Heights, Tex.	Jun. May 7, 1913 Assoc. M. Mar. 12, 1918	
FAIRMAN, JAMES ROBERT. Capt., Engrs. U. S. R., Fort Leavenworth, Kans.; Address, 4645 Aldrich Ave., South, Minneapolis, Minn.		Oct. 9, 1917
FISHER, WARD HERBERT. Mt. Comfort, Ind.		Mar. 12, 1918
FLOOK, LYMAN RUSSELL. 1st Lieut., Ord. U. S. R., Govt. Nitrate Fixation Plant No. 1, Sheffield, Ala. (Res., 1309 Washtenaw Ave., Ann Arbor, Mich.)	Jun. Dec. 3, 1913 Assoc. M. Mar. 12, 1918	
GAREN, GEORGE MASON. Div. Engr., Norfolk Q. M. Terminal, Care, Col. M. A. Butler, Norfolk, Va.		April 16, 1918
GAUGER, PAUL CHARLES. Engr. and Supt., George J. Grant Constr. Co., 945 Osceola Ave., St. Paul, Minn.		April 16, 1918
GOODWIN, RALPH EDWARD. Estimator, Chile Exploration Co., 847 Boulevard East, Weehawken, N. J.	Jun. Oct. 1, 1912 Assoc. M. April 16, 1918	
GRIER, ALEXANDER MONRO. San Engr., E. I. du Pont de Nemours & Co., Wilmington, Del.		April 16, 1918
HYMAN, HENRY H. Mgr., Operation and Constr., Miami Elec. Light & Power Co., Box 875, Miami, Fla.		April 16, 1918
LOWREY, SAMUEL MACELROY. Engr., McLean Contr. Co. (Res., 317 East North Ave.), Baltimore, Md.	Jun. Sept. 3, 1912 Assoc. M. April 16, 1918	
MILHOLLAND, CLARENCE VICTOR. Levelman, Transitman, and Field Engr., B. & O. R. R., 30 Citizens Bank Bldg., Parkersburg, W. Va.		April 16, 1918
MONTGOMERY, JULIAN. Chf. Office Engr., State Highway Dept., Austin, Tex.		April 16, 1918
MOORE, CHARLES AUDIE. Vice-Pres., H. L. Stevens & Co., 910 South Michigan Ave., Chicago, Ill.		Mar. 12, 1918
MUNKELT, FREDERICK HERMAN. Care, The Petroleum Iron Works Co. of Ohio, 613 Munsey Bldg., Washington, D. C.	Jun. April 5, 1910 Assoc. M. April 16, 1918	
SACKS, SAMUEL ISAIAH. Draftsman, Dept. of City Transit, 1755 North 31st St., Philadelphia, Pa.	Jun. Nov. 3, 1915 Assoc. M. April 16, 1918	

ASSOCIATE MEMBERS (*Continued*)Date of
Membership.

SCHOENBERGER, GEORGE CHRISTIAN. Care, Board of State Engrs., 213 New Orleans Court Bldg., New Orleans, La.....		Nov. 27, 1917
SERRA, JULIUS HERSCHEL. 28 Warwick Rd., } Jun. Jan. 3, 1911		
Melrose Highlands, Mass..... } Assoc. M. April 16, 1918		
SHURE, AUSTIN FERREE. Res. Engr., Maryland State Roads Comm., Chestertown, Md.....		Mar. 12, 1918
STEVENSON, CHARLES SAMUEL. Civ. and Min. Engr., Pulaski Iron Co., Box 94, Eckman, W. Va.....		April 16, 1918
TEBES, PAUL MCGOWAN. Constr. Engr., Pennsylvania Highway Dept., 1845 Whitehall St., Harrisburg, Pa.....		April 16, 1918
TOMPKINS, ROBERT HARRY. 1st Lieut., 111th Engrs., Camp Bowie, Tex.....		Mar. 12, 1918
VANDERHOOF, ARNOLD HINES. U. S. Naval Radio Station, New Brunswick, N. J.....		April 16, 1918
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RESIGNATIONS

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	Date of Resignation.
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JONSON, ERNST FREDRIK.....	April 16, 1918
KRAUSE, LOUIS GUSTAV.....	April 16, 1918
MARSH, FRANCIS BEAL.....	April 16, 1918

JUNIORS

BACON, ETHELBERT.....	April 16, 1918
CARTWRIGHT, HENRY HART.....	April 16, 1918

DEATHS

- DAVENPORT, JAMES AUBREY. Elected Member, April 5th, 1905; died March 15th, 1918.
- HAGAR, EDWARD McKIM. Elected Associate Member, February 6th, 1901; died January 18th, 1918.
- HUGGINS, WILLIAM. Elected Member, February 7th, 1906; died February 21st, 1918.
- LAMONT, CLARENCE BOOTH. Elected Associate Member, May 4th, 1909; Member, June 24th, 1914; died March 21st, 1918.
- LOWE, JESSE. Elected Member, October 2d, 1895; died April 17th, 1918.
- MARPLE, WILLIAM McKELVEY. Elected Member, June 4th, 1890; died March 20th, 1918.
- MUENSCHER, EMORY WASHBURN. Elected Member, July 5th, 1893; date of death unknown.
- ROBERTSON, MARSHALL POPE. Elected Associate Member, March 5th, 1902; Member, September 4th, 1906; died November, 1917.
- THOMPSON, CLARK WALLACE. Elected Junior, March 5th, 1890; Associate Member, July 3d, 1895; died March 16th, 1918.

Total Membership of the Society, May 2d, 1918,
8 695.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(April 1st to 30th, 1918)

NOTE.—This list is published for the purpose of placing before the members of this Society the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- | | |
|---|---|
| (2) <i>Journal</i> , Engrs. Club of Phila., Philadelphia, Pa. | (36) <i>Cornell Civil Engineer</i> , Ithaca, N. Y. |
| (3) <i>Journal</i> , Franklin Inst., Philadelphia, Pa., 50c. | (42) <i>Proceedings</i> , Am. Inst. Elec. Engrs., New York City, \$1. |
| (4) <i>Journal</i> , Western Soc. of Engrs., Chicago, Ill., 50c. | (43) <i>Annales des Ponts et Chaussées</i> , Paris, France. |
| (5) <i>Transactions</i> , Can. Soc. C. E., Montreal, Que., Canada. | (45) <i>Coal Age</i> , New York City, 10c. |
| (6) <i>Journal</i> , Am. Inst. of Archts., Washington, D. C., 50c. | (46) <i>Scientific American</i> , New York City, 15c. |
| (8) <i>Stevens Indicator</i> , Hoboken, N. J., 50c. | (47) <i>Mechanical Engineer</i> , Manchester, England, 3d. |
| (9) <i>Industrial Management</i> , New York City, 25c. | (54) <i>Transactions</i> , Am. Soc. C. E., New York City, \$12. |
| (11) <i>Engineering</i> (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c. | (55) <i>Transactions</i> , Am. Soc. M. E., New York City, \$10. |
| (12) <i>The Engineer</i> (London), International News Co., New York City, 35c. | (56) <i>Transactions</i> , Am. Inst. Min. Engrs., New York City, \$6. |
| (13) <i>Engineering News-Record</i> , New York City, 15c. | (57) <i>Colliery Guardian</i> , London, England, 5d. |
| (15) <i>Railway Age</i> , New York City, 15c. | (58) <i>Proceedings</i> , Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c. |
| (16) <i>Engineering and Mining Journal</i> , New York City, 15c. | (59) <i>Proceedings</i> , American Water-Work Assoc., Troy, N. Y. |
| (17) <i>Electric Railway Journal</i> , New York City, 10c. | (60) <i>Municipal Engineering</i> , Indianapolis, Ind., 25c. |
| (18) <i>Railway Review</i> , Chicago, Ill., 15c. | (61) <i>Proceedings</i> , Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c. |
| (19) <i>Scientific American Supplement</i> , New York City, 10c. | (62) <i>American Drop Forger</i> , Thaw Bldg., Pittsburgh, Pa., 10c. |
| (20) <i>Iron Age</i> , New York City, 20c. | (63) <i>Minutes of Proceedings</i> , Inst. C. E., London, England. |
| (21) <i>Railway Engineer</i> , London, England, 1s. 2d. | (64) <i>Power</i> , New York City, 5c. |
| (22) <i>Iron and Coal Trades Review</i> , London, England, 6d. | (65) <i>Official Proceedings</i> , New York Railroad Club, Brooklyn, N. Y., 15c. |
| (23) <i>Railway Gazette</i> , London, England, 6d. | (66) <i>Gas Journal</i> , London, England, 6d. |
| (24) <i>American Gas Engineering Journal</i> , New York City, 10c. | (67) <i>Cement and Engineering News</i> , Chicago, Ill., 25c. |
| (25) <i>Railway Mechanical Engineer</i> , New York City, 20c. | (71) <i>Journal</i> , Iron and Steel Inst., London, England. |
| (26) <i>Electrical Review</i> , London, England, 4d. | (71a) <i>Carnegie Scholarship Memoirs</i> , Iron and Steel Inst., London, England. |
| (27) <i>Electrical World</i> , New York City, 10c. | (72) <i>American Machinist</i> , New York City, 15c. |
| (28) <i>Journal</i> , New England Water-Works Assoc., Boston, Mass., \$1. | (73) <i>Electrician</i> , London, England, 18c. |
| (29) <i>Journal</i> , Royal Society of Arts, London, England, 6d. | (74) <i>Transactions</i> , Inst. of Min. and Metal., London, England. |
| (32) <i>Mémoires et Compte Rendu des Travaux</i> , Soc. Ing. Civ. de France, Paris, France. | (75) <i>Proceedings</i> , Inst. of Mech. Engrs., London, England. |
| (33) <i>Le Génie Civil</i> , Paris, France, 1 fr. | (77) <i>Journal</i> , Inst. Elec. Engrs., London, England, 5s. |

- (83) *Gas Age*, New York City, 15c.
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
 (86) *Engineering and Contracting*, Chicago, Ill., 10c.
 (87) *Railway Maintenance Engineer*, Chicago, Ill., 10c.
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.
 (90) *Transactions*, Inst. of Naval Archts., London, England.
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.
 (113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.
 (114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.
 (115) *Journal*, Engrs.' Club of St. Louis, St. Louis, Mo., 35c.
 (116) *Blast Furnace and Steel Plant*, Pittsburgh, Pa., 15c.
 (117) *Engineering and Cement World*, Chicago, Ill.
 (118) *Times Engineering Supplement*, London, England, 2d.

LIST OF ARTICLES

Bridges.

- Waterville Road Overhead Bridge, West Macon, Ga.* Albert M. Wolf. (117) Mar. 15.
 Construction Features of Derby-Shelton Concrete Bridge.* (86) Mar. 27.
 Hinged Polygonal Steel Arch Carries Viaduct Spans.* (13) Mar. 28.
 An Example of Early Truss Bridge.* (87) Apr.
 Moving Three Bridge Spans on Car Trucks.* (87) Apr.
 Concrete Encased Plate Girder Bridge of Unusual Design.* Albert M. Wolf. (117) Apr. 1.
 Suspension Bridge for Grand Mere, P. Q. Romeo Morrisette.* (96) Apr. 4.
 Necessity for Engineering Supervision Over Bridge Maintenance.* G. P. Burch. (117) Apr. 15.
 Method of Constructing and Sinking Floating Caisson for a Bridge Pier. G. W. Mayo. (Abstract of article in *Quarterly Bulletin* of the Bureau of Public Works, Manila.) (86) Apr. 17.
 Arch Bridge is Concreted from Cars on Elevated Track.* (13) Apr. 18.
 Drum and Track Failure Endangers Important Swingbridge.* (13) Apr. 18.
 Effective Concrete Architecture in New Viaduct.* (13) Apr. 18.
 Kettle Rapids Bridge.* W. Chase Thomson. (Abstract of paper read before Montreal Branch of the Canadian Soc. of Civil Engrs.) (96) Apr. 18.
 Wooden Floors on Highway Bridges are now Obsolete. J. A. L. Waddell. (13) Apr. 25.
 Reinforced Concrete Railway Trestle at Toronto.* Arthur F. Wells. (96) Apr. 25.

Electrical.

- Insulation Under Direct and Alternating Current, Particularly as Regards Moisture.* Prof. Thornton. (Address before North of England Branch of the Assoc. of Min. Elec. Engrs.) (26) Mar. 15.
 Concrete in Power Plant Construction of New Central Station for Columbus.* (117) Mar. 15.
 Bonus for Power Plant Employees. Warren B. Lewis. (64) Mar. 26.
 Tamarack Mills Power Plant.* Charles H. Bromley. (64) Mar. 26.
 Elementary Principles of Continuous-Current Armature Winding.* F. M. Denton. (73) Mar. 29.
 Harmonics in Symmetrical M-Phase Systems. V. Karapetoff. (Paper read before Am. Assoc. for the Advancement of Science.) (27) Mar. 30.
 Operating Temperatures in Large A.-C. Generators.* H. D. Stephens. (27) Mar. 30.
 Safety Features in Switching Apparatus.* M. M. Samuels and F. N. Bechoff. (27) Mar. 30.

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- Compression Rheostats. Arthur H. Allen. (2) Apr.
 No-Load Conditions of Single-Phase Induction Motors and Phase Converters.* R. E. Hellmund. (42) Apr.
 Sag-Temperature Calculations of Transmission Lines on Steep Grades.* Alfred Still. (3) Apr.
 Some Applications of Electromagnetic Theory to Matter. (42) Apr.
 Central Stations and the Manufacture of Electrochemical Products. C. A. Winder. (Address made before the Ohio Electric Light Assoc.) (105) Apr. 1.
 Iron and Steel Conductors.* R. C. Powell. (111) Apr. 1.
 Power Plant Losses.* R. J. C. Wood. (11) Apr. 1.
 Standardization of Pin Type Insulators. L. M. Klauber and R. E. Cunningham. (111) Apr. 1.
 Improving Synchronous-Motor Starting Features.* Theo. Schou. (27) Apr. 6.
 Construction of Outdoor Substation at Madera, Cal.* L. J. Moore. (27) Apr. 6.
 Industrial Load Characteristics.* J. E. Mellett. (27) Apr. 6.
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 Ball Bearings for Electric Motors. A. H. MacCaffray. (72) Apr. 11.
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 Parallel Operation of Direct-Current Generators.* T. F. Barton. (64) Apr. 16.
 Copper Castings for Electrical Purposes.* G. F. Comstock. (Abstract of paper read before Am. Electrochemical Soc.) (20) Apr. 18.
 The Characteristics of Dielectrics.* Chester Arthur Butman. (27) Apr. 20.
 Steam-Electric Power-Plant Design. A. S. Solzeaux. (Abstract of paper read before Johns Hopkins Univ.) (64) Apr. 23.

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- Marine Welding at the Balboa Shops.* (62) Mar.
 Coal Handling Plant at Oran, Algeria.* (12) Mar. 8.
 Ferro-Concrete Ships. T. J. Gueritte. (Abstract of paper read before North-East Coast Inst. of Engrs. and Shipbuilders.) (12) Mar. 15.
 Standard Cargo Ships.* George Carter. (Abstract of paper read before Inst. of Naval Architects.) (11) Mar. 22; (12) Mar. 22.
 The Most Suitable Sizes and Speeds for General Cargo Steamers.* John Anderson. (Paper read before Inst. of Naval Architects.) (11) Mar. 22.
 Reinforced-Concrete Sea-Going Cargo Steamers.* T. G. Owens Thurston. (Abstract of paper read before Inst. of Naval Architects.) (11) Mar. 29.
 The Merchant Ship of the Future. W. S. Abell. (Abstract of paper read before Inst. of Naval Architects.) (11) Mar. 29.
 Reinforced Concrete Vessels.* Walter Pollock. (Abstract of paper read before Inst. of Naval Architects.) (12) Mar. 29; (11) Apr. 5.
 Notes on Shipbuilding.* F. J. French. (55) Apr.
 The Development of Concrete Barge and Ship Construction.* J. E. Freeman. (55) Apr.
 The Possibilities of the Ferro-Concrete Ship.* Maurice Denny. (Paper read before Inst. of Naval Architects.) (11) Apr. 5.
 Timber Derrick Gantry Crane for Ship Erection.* Max J. Welch. (13) Apr. 11.
 How Wireless Helps the Mariner.* Robert A. Lavender. (19) Apr. 13.
 Unsinkable Ships. Charles V. A. Eley. (Abstract of paper read before British Inst. of Marine Engrs.) (19) Serial beginning Apr. 13.
 Application of Reinforced Concrete to Ship Construction.* Allen Hoar. (86) Apr. 24.

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- Keeping the Gas Mantle Business Going as Usual.* (83) Feb. 15.
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 Coal Economy from a National Standpoint.* W. H. Casmev. (Abstract of paper read before Manchester Geol. and Min. Soc.) (106) Mar.
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- Economy of Fuel in Cement Plants.* (117) Mar. 15.
- From Crushers to Kilns in Cement Plant.* (117) Mar. 15.
- Rotary Continuous Process in Manufacture of Gypsum.* (117) Mar. 15.
- Power from Waste and Inferior Fuels.* J. Drummond Paton. (Abstract of paper read before Manchester Geological and Min. Soc.) (57) Mar. 22.
- A Gas-Coke-Producer-Fired Tank-Furnace for the Production of White Glass. A. B. Roxburgh. (Abstract of paper read before Glass-Makers' Soc.) (66) Mar. 26.
- Effect of Velocity and Humidity of Air on Heat Transmission Through Glass. (86) Mar. 27.
- The Texture of Coke Oven Bricks. W. G. Fearnside. (Abstract of paper read before Midland Section of Coke Oven Managers' Assoc.) (57) Mar. 28.
- A Modern Plant for Thawing Coal in Cars.* Scott W. Linn. (15) Mar. 29.
- Is Our Fuel Supply Nearing Exhaustion? R. H. Fernald. (2) Apr.
- A New Theory of Plate Springs.* David Lindau and Percy H. Parr. (3) Apr.
- Economy in the Use of Fuel in Power Stations.* Charles H. Parker. (109) Apr.
- Making Substitutions for Natural Gas. F. Denk. (116) Apr.; (62) Apr.
- Rates for Public Utilities Service. J. M. Spitzglass. (Paper read before Illinois Gas Assoc.) (83) Apr. 1.
- War Time Shoe Factory Lighting.* (83) Apr. 1.
- Simple Washing in the Filter-Press.* D. R. Sperry. (105) Apr. 1.
- Calibrated Flow Meter Tells Amount of Coal and Air Required.* (117) Apr. 1.
- Lime Burning Fuels and the Processes Compared.* (117) Apr. 1.
- Suggested Remedies for Spontaneous Combustion in Coal Storage. (117) Apr. 1.
- Bonus Plan for Boiler-Plant Operatives.* Haylett O'Neill. (64) Apr. 2.
- Burning Slack Containing Excessive Moisture.* J. F. McCall. (64) Apr. 2.
- Underground Steam Mains.* Charles L. Hubbard. (64) Apr. 2.
- Seattle Keeps Accurate Records of Auto Trucks and Automobile Operations.* C. A. Osler. (13) Apr. 4.
- Metal Planing Machines of Concrete.* Charles Lundberg. (20) Apr. 4.
- Spontaneous Heating of Slack Heaps. George Knox. (From *Journal of the Monmouthshire Colliery Officials' Assoc.*) (57) Apr. 5.
- Warm-Air Furnace Heating Plant Design. (101) Apr. 5.
- Coal: The Resource and Its Full Utilization. Chester G. Gilbert and Joseph E. Pogue. (Abstract). (18) Apr. 6.
- Notes on a High Temperature Thermostat.* J. L. Haughton and D. Hanson. (19) Apr. 6.
- What Substitution of Oil for Coal Can Do.* (27) Apr. 6.
- The Byproduct Coke Oven, Its Coke and Its Byproducts.* William Hutton Blauvelt. (45) Serial beginning Apr. 6.
- Testing an Air-Compressor.* Walter S. Weeks. (103) Apr. 6.
- Unpreventable Losses in Coal Combustion Under Boilers.* Haylett O'Neill. (64) Apr. 9.
- Making Concrete Metal-Planing Machine.* Ethan Viall. (72) Apr. 11.
- Figuring Radiation and Furnace Pipe Sizes.* (101) Apr. 12.
- Handling Coal and Ashes in the Boiler House.* Henry J. Edsall. (45) Apr. 13.
- The Place of Women in the Industries: Illustrated by Examples of Employment in the Gas Works of London at the Present Time.* (83) Apr. 15.
- Use of Tar Oil in Internal Combustion Engines.* A. W. H. Griepe. (83) Apr. 15.
- Questionnaire on Power Conservation. (111) Apr. 15.
- Long-Distance Hauling by Motor Trucks. Perry E. Beam. (Abstract of paper read before Motor Truck Club of Philadelphia.) (117) Apr. 15.
- Low-Pressure Turbines for Lineshaft Drive.* R. J. Horne. (64) Apr. 16.
- Spontaneous Ignition of Bituminous Coal.* J. F. Springer. (64) Apr. 16.
- Underground Steam Mains.* Charles L. Hubbard. (64) Apr. 16.
- Efficient Tool Room System.* (20) Apr. 18.
- Refrigeration a Side Line for Plumbing and Heating Contractors.* I. C. E. (101) Apr. 19.
- Features of Steam Plant Supplementing Water Power.* (27) Apr. 20.
- Combustion of Coal and Design of Furnaces.* (Abstract of Bureau of Mines Bulletin No. 135.) (64) Apr. 23.
- Co-operation of Public-Service and Isolated Plants. Ira N. Evans. (64) Apr. 23.
- Stoker Capacity vs. Boiler Forcing Rates.* Joseph T. Foster. (64) Apr. 23.
- Human Problem Thought of Paramount Importance in Paris Shrapnel Plant.* Robert K. Tomlin, Jr. (13) Apr. 25.
- Hot Water Heating by Forced Circulation.* (101) Apr. 26.

Metallurgical.

- Rolling Mills and the Electric Drive.* L. Rothera. (Abstract of paper read before Manchester Assoc. of Engrs.) (22) Feb. 22.
- Heat Treating Axles for the Army Truck.* A. W. Peterson. (62) Mar.
- Marine Welding at the Balboa Shops.* (62) Mar.

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- Natural Ventilation for Forge Shops.* F. M. Paull. (62) Mar.
 Pyrometry and Its Several Limitations. Charles B. Thwing. (62) Mar.
 Power Required by Cold Rolling Mills.* C. E. Davies. (12) Mar. 15.
 The Measurement of the Permeability of Iron Stampings by Ewing's Double Bar and Yoke Method.* Frank Shaw. (73) Mar. 22.
 The Design of Blooming Mills. H. H. Hummel. (20) Mar. 28.
 Manufacture of the 4.7-Inch Gun Model 1906.* E. A. Suverkrop. (62) Mar. 28.
 The Process of Casehardening. E. Standiford. (62) Mar. 28.
 Castings of Admiralty Bronze.* H. C. H. Carpenter and C. F. Elam. (Abstract of paper read before Inst. of Metals.) (11) Mar. 29.
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 Wearing Qualities of Heat Treated Gears.* W. H. Phillips. (Abstract of paper read before Steel Treating Research Soc.) (62) Serial beginning Apr.
 Standardization of Rare-Metal Thermocouples.* Paul D. Foote and others. (105) Serial beginning Apr. 1.
 The Design and Operation of a Small Kjellin Furnace.* George H. Stanley and W. Buchanan. (105) Apr. 1.
 Brick Chimney of Record Height Built to Carry Off Smelter Gases.* Charles Evan Fowler. (13) Apr. 4.
 Erichsen Tests on Aluminum Sheets.* Robert J. Anderson. (20) Apr. 11.
 Overcoming Troubles in Cupola Operation. Paul R. Ramp. (20) Apr. 11.
 The Steel Base and Galvanized Sheets.* (20) Apr. 11.
 Principle of the Generation and Application of Heat in Steel Treating.* A. F. MacFarland. (72) Apr. 11.
 Cascade Method of Froth-Flotation.* H. Hardy Smith. (103) Apr. 13.
 Roasting Zinc Ore for Leaching. Floyd Dixie James. (103) Apr. 13.
 Bibliography on the Physical Properties of Copper. Paul D. Merica. (105) Apr. 15.
 Copper Castings for Electrical Purposes.* G. F. Comstock. (Abstract of paper read before Am. Electrochemical Soc.) (20) Apr. 18.
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 Determining Flow Sheets in New Mills. A. Schwarz. (16) Apr. 27.

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- Manufacture of the 4.7-Inch Gun Model 1906.* E. A. Suverkrop. (62) Mar. 28.
 An Ambulance Train for the United States Army.* (15) Apr. 19.
 Velocity and Range of Guns.* J. Bernard Walker. (46) Serial beginning Apr. 20.
 Human Problem Thought of Paramount Importance in Paris Shrapnel Plant.* Robert K. Tomlin, Jr. (13) Apr. 25.

Mining.

- Endless-Rope Haulage at North Seaton Colliery.* J. T. Manderson. (Abstract of paper read before North of England Branch of the National Assoc. of Colliery Managers.) (22) Feb. 22.
 A System of Storing and Filling Small Coal, with Remarks upon the Prevention of Spontaneous Heating in Coal-Heaps.* John Morison. (106) Mar.
 Stripping and Relining a Shaft at Cowdenbeath, Fife. Henry Rowan. (106) Mar.
 The Strength of Pit-Props.* Fred. L. Booth. (106) Mar.
 Underground Conveyors.* Harold C. Jenkins. (106) Mar.
 Notes on Colliery Turbo Plant.* L. Fokes. (57) Mar. 15.
 Useful Instruments for Colliery Power Plants.* H. W. Ravenshaw. (Paper read before the Midland Inst. of Min., Civil and Mech. Engrs.) (57) Mar. 15.
 Modern Methods of Shaft Sinking.* W. H. Maxwell. (57) Serial beginning Mar. 28.
 Sampling Coal for Shipment or Delivery. George S. Pope. (U. S. Bureau of Mines, *Technical Paper 133*.) (57) Mar. 28.
 Cement Gun in Mining Work.* George S. Rice. (16) Serial beginning Mar. 30.
 Driftion Breaker of the Lehigh Valley Coal Company.* Effingham P. Humphrey. (45) Mar. 30.
 Drilling on the Lena Goldfield, Siberia. W. E. Thorne. (103) Mar. 30.
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- The Oil-Shale of Colorado.* R. L. Chase. (103) Mar. 30.
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 New Plant and Mines of the Coal Run Mining Company.* Dever C. Ashmead. (45) Apr. 6.
 Working Thin Beds by Longwall. Rowland Gascoyne. (45) Apr. 6.
 Electric Operation Permits Economical Gravel Plant Layout.* E. Earl Glass. (13) Apr. 11.
 Successful Shoveling Machine.* (45) Apr. 13.
 Successful Steel Breakers of the Lehigh Valley Coal Company.* George W. Harris. (45) Apr. 13.
 The Oil-Shale Industry.* Arthur J. Hoskin. (103) Apr. 13.
 Mechanical Mining Without Explosives.* N. D. Levin. (45) Apr. 13.
 Reduction of Water-Infiltration in Oil-Wells.* R. P. McLaughlin. (103) Apr. 13.
 Revolving Dumps at Docena and Edgewater.* (45) Apr. 13.
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 Sacramento Hill Disseminated Copper Deposit.* Courtenay De Kalb. (103) Apr. 20.
 Strip Mining Where Bad Roof Prevails. Ralph W. Mayer. (45) Apr. 20.
 Manganese Deposits of Clark County, Nevada.* Fred. A. Hale, Jr. (16) Apr. 27.
 The Kentucky Oil Fields.* W. N. Thayer. (16) Apr. 27.
 Use of the Cement Gun in the Cœur d'Alene Mining District.* (16) Apr. 27.

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- The Benefits of Good Shop Illumination. W. T. Blackwell. (62) Mar.
 Problems in Atomic Structure.* J. J. Thomson. (Abstract of paper read before Royal Inst.) (11) Serial beginning Mar. 22.
 The Organization of Commercial Intelligence. William H. Clark. (29) Mar. 22.
 A Neutral-Tint and Variable-Tint Screen.* E. Karrer. (3) Apr.
 How to Reduce the Turnover of Labor. Ernest C. Gould. (20) Apr. 4.
 Economic Considerations in Municipal Engineering Designs. Clinton S. Burns. (86) Apr. 10.
 Engineering and Co-Operation. Ira N. Hollis. (Abstract of paper read before Cleveland Eng. Soc.) (96) Apr. 11.
 The Dufay Versicolor Process in Color Photography.* (Translated from *La Nature*.) (19) Apr. 13.
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 Engineering Prestige. R. O. Wynne-Roberts. (96) Apr. 18.

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- New 180-Ton Locomotives for the New York, New Haven & Hartford Railroad.* E. R. Hill. (65) Mar. 15.
 Railway Surveying in China. (29) Mar. 29.
 Improvements on the Yazoo & Mississippi Valley.* (15) Mar. 29.
 Specifications for the United States Standard Cars. (15) Mar. 29.
 Difficulties of Locomotive Lubrication.* (18) Mar. 30.
 United States Railroad Administration's Freight Car Equipment Standards.* (18) Mar. 30.
 Freight Car and Tender Truck Bolsters.* G. S. Chiles and R. G. Kelley. (25) Apr.
 Renewal of Rail on the Norfolk & Western.* W. P. Wiltsee. (87) Apr.
 The Possibilities of a Maintenance Shop.* C. O. Hooper. (87) Apr.
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 Divide Cost Five Ways on Alton Grade Separation.* (13) Apr. 4.
 Railway Electrification. John Murphy. (96) Apr. 4.
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 Why Locomotives Should not be Standardized.* (15) Apr. 5.
 Greater Uniformity in Track Spirals Will Conduce to Economy.* E. M. T. Ryder. (17) Apr. 6.
 One Hundred Tons Capacity Steel Hopper Car, Norfolk & Western Ry.* (18) Apr. 6.
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 Concreting Train in Which Cement and Aggregate are Carried in Small Ore Cars.* (86) Apr. 17.
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 Torpedoes as Fog Signals on Belgian State Railways.* L. Weissenbruch. (15) Apr. 25.

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- Determining When Rail Should be Renewed.* C. W. Baldrige. (15) Apr. 26.
 Seventeen Years Life from Treated Ties.* (15) Apr. 26.
 Baldwin-Westinghouse Passenger Locomotive for the Chicago, Milwaukee & St. Paul Ry.* F. H. Shepard. (18) Apr. 27.
 Economy in Maintenance and Operation of Locomotives.* C. A. Greenough. (18) Apr. 27.
 New 50-Ton Electric Locomotive for Swiss Mountain Climbing. (17) Apr. 27.
 P. R. R. Extends Philadelphia Electrification to Chestnut Hill.* (17) Apr. 27.
 Santa Fe Locomotive for the Belt Railway of Chicago.* (18) Apr. 27.
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- Track Construction Methods Employed in Great Street Widening Plan.* (17) Mar. 30.
 Automatic Substation of New Type on Ohio Electric.* R. J. Wensley. (17) Apr. 13.
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 Why the Automatic Substation Saves Materials and Labor.* C. F. Lloyd. (17) Apr. 13.
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Roads and Pavements.

- Essentials of Good Practice in the Construction of Concrete Roads.* Edwin K. Borchard. (60) Mar.
 Bituminous Pavements, Adaptable to Various Conditions with Special Reference to Type and Thickness.* L. Kirschbraun. (60) Mar.
 How Road Machinery Will Conserve Labor Supply.* (117) Mar. 15.
 Material Survey an Essential for Economic Highway Construction.* H. S. Mattimore. (117) Mar. 15.
 Motor Trucks for Snow Removal Superior to Teams. (13) Mar. 28.
 Considerations Affecting the Design of Pavement Foundations. H. J. Fixmer. (60) Apr.
 Recommended Procedure in the Construction of Wood Block Pavements.* Lambert T. Ericson. (60) Apr.
 Construction Plant and Methods Employed in Building Concrete Roads in Wayne County, Mich.* (60) Apr.
 Methods and Cost of Constructing and Maintaining Secondary Roads in Southern California.* E. Earl Glass. (86) Apr. 3.
 More Equitable Contracts Between Highway Commissions and Contractors. James C. Travilla. (Abstract of paper read before Am. Road Buildings' Assoc.) (86) Apr. 3; (117) Mar. 15; (96) Apr. 11.
 Methods and Cost of Snow Removal Work by South Park Commissioners, Chicago. (86) Apr. 3.
 Method of Constructing Asphaltic Concrete on Dundas St., York County, Ontario. (86) Apr. 3.
 Uniform Maintenance Cost-Records for Roads Adopted in Washington. George F. Cottrell. (13) Apr. 4.
 Uniform Methods of Road Construction Accounting Desirable. Edward N. Hines. (13) Apr. 11.
 Street Paving at Boulder, Colorado. H. E. Phelps. (117) Apr. 15.
 Study of Fillers for Street Pavements. Karl C. Kastberg. (117) Apr. 15.
 Cost Curve of Highway Maintenance has Well-Defined Minimum. H. G. Shirley. (13) Apr. 18.
 Iowa County Builds Brick Road from Camp Dodge to Des Moines.* (13) Apr. 18.
 Purely Theoretic Superelevations Modified for Roads.* W. S. Downs. (13) Apr. 25.

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- Some Characteristic Design Features of the Northeast Sewage Treatment Works at Philadelphia.* W. L. Stevenson. (60) Mar.
 Present Tendencies in Sewer Construction and Design.* H. K. Barrows. (60) Apr.
 The New Sewage Treatment Plant at Xenia, Ohio.* W. J. Sherman. (60) Apr.
 Design and Cleaning of Sewer Catch Basins.* George A. Carpenter. (60) Apr.
 Specific Suggestions on the Design of Imhoff Sewage Settling Tanks.* Charles F. Mebus. (60) Apr.
 Triple-Expansion Pumping Engines for the London County Council.* (Sewage Pumping.) (11) Serial beginning Apr. 5.
 Suggestions on the Design and Operation of Sewage Treatment Plants. J. H. Dunlap. (Abstract of paper read before Iowa Eng. Soc.) (86) Apr. 10; (13) Apr. 18.

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- Estimating Contractors' Overhead Costs in Sanitary Sewer Construction. Stanley D. Moore. (Abstract of paper read before Iowa Eng. Soc.) (86) Apr. 10; (96) Apr. 25.
- Considerations Leading to Recommendations for Fine Screens, Sprinkling Filters, Humus Tanks and Sludge Recovery as Sewage Disposal Method for Indianapolis. George W. Fuller. (Abstract of paper read before Indiana Sanitary and Water Supply Assoc.) (86) Apr. 10.
- Estimating Sewage Flow from Floor Area. Walter S. McGrane. (Abstract of paper read before Mun. Engrs. of the City of New York.) (96) Apr. 25.
- Distinctive Characteristics of Institutional Sewerage. Henry W. Taylor. (13) Apr. 25.
- Sanitary Equipment of a Suburban Home.* M. B. N. (101) Apr. 26.

Structural.

- Seven Year Tests Showing the Effect of Age and Curing Conditions.* M. O. Withey. (117) Mar. 15.
- Theory of Proportioning Mixtures for Pipe and Tile Concrete. R. C. Crum. (117) Mar. 15.
- Comparative Cost Estimating for Designers of Reinforced Concrete Buildings.* Clayton W. Mayers. (Abstract of paper read before the Am. Concrete Inst.) (86) Mar. 27.
- Causes and Prevention of Failure in Creosoted Wood Block Factory Floors. Lambert J. Ericson. (Abstract of paper read before Am. Wood Preservers' Assoc.) (86) Mar. 27.
- Some Notes on Flat Slab Design: Bending Moments, Exterior Panels, Spandrels, Arrangement of Reinforcement.* Albert M. Wolf. (86) Mar. 27.
- Results of Test on Robert Simpson Building.* W. W. Pearse and Peter Gillespie. (96) Mar. 28.
- The Question of Unbalanced Thrust.* Peter Gillespie. (96) Mar. 28.
- Timber-Arch Truss Roof with Steel Gusset-Plates.* H. W. Shely. (13) Mar. 28.
- Rapid House Construction with Concrete Studs.* (13) Mar. 28.
- Concrete Silos are Money Makers.* (67) Apr.
- Top Finish of Concrete Floors. P. M. Bruner. (67) Apr.
- The New Art of Interior Decoration.* J. R. Willison. (108) Apr.
- Light and Ventilation Insured in Factory by Unique Roof.* Nelson J. Bell. (13) Apr. 4.
- Computing Moments on Irregularly Spaced Flat-Slab Panels.* W. Stuart Tait. (13) Apr. 4.
- Brick Chimney of Record Height Built to Carry Off Smelter Gases.* Charles Evan Fowler. (13) Apr. 4.
- Unit-Built Concrete Cottages to House Foreign Labor.* (13) Apr. 11.
- Balloon Framing with Concrete.* (45) Apr. 13.
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- Effect of Heating Concrete Materials in the Mixer. H. E. Sawtell. (117) Apr. 15.
- Steel Roof Trusses are Designed as Elastic Arches.* W. Stuart Tait. (13) Apr. 18.
- Concrete in Western Canada. J. F. Greene. (Abstract of paper read before Manitoba Branch of the Canadian Soc. of Civil Engrs.) (96) Apr. 18.
- Some Practical Points in the Design and Construction of Partitions. H. L. Barraclough. (Abstract of paper read before Concrete Institute.) (96) Apr. 18.
- Floors Made of Wood Blocks.* (46) Apr. 20.
- Digging Holes with a Pile Driver.* (45) Apr. 20.
- Recent Dwelling Construction in Pennsylvania.* Dever C. Ashmead. (45) Apr. 20.
- New Features in Heavy Machine Shop Design in Manufacturing Building of International Harvester Corporation.* W. S. Tait. (86) Apr. 24.
- Eccentric Loading Tests Result Contrary to Theory.* John C. Prior. (13) Apr. 25.

Topographical.

- The Ross Meridiograph.* J. T. Beard. (45) Apr. 20.

Water Supply.

- Results of the Chlorination of Public Water Supplies in Michigan. Edward D. Rich. (60) Mar.
- How a Deficit of \$2 000 Was Changed to a Surplus of \$27 000 in One Year at the Waltham Water Works.* Bertram Brewer. (60) Mar.
- The Range of Results Obtainable in the Use of Concrete in Water Tank Construction.* C. C. Whitaker. (60) Mar.
- Some Methods and Results of Filtration at Providence Water Works.* Frank L. Cady. (28) Mar.
- Control of Microscopic Organisms in Water Supplies. Wm. Haine. (28) Mar.
- Rate Revision in Municipal Works. Bertram Brewer. (28) Mar.

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- Construction of the Phelps Brook Dam: Water Supply for Hartford, Conn. J. F. Shaughnessy. (28) Mar.
- Matheson Joint Steel Water Mains.* F. N. Speller. (28) Mar.
- Tentative Draft of Standard Specifications for Cast-Iron Water Pipe and Fittings, Prepared by Joint Committee of the American and New England Water Works Associations. (28) Mar.
- 16 000 000-Gallon Elevated Reservoirs at Buenos Aires.* (12) Mar. 15.
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